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UNIVERSITY OF ALBERTA

# Metacognitive Change in Emergent Readers during Reading Acquisition

by: Judy Pool ©

A Thesis Submitted to the Faculty of Graduate Studies and Research In
Partial Fulfillment Of The Requirements For The Degree Of Master Of
Education
in Special Education
Department of Educational Psychology

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MASTER OF EDUCATION

1994

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Judy Pool

October 27, 1993

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled METACOGNITIVE CHANGE IN EMERGENT READERS DURING READING ACQUISITION submitted by JUDY POOL in partial fulfillment of the requirements for the degree of MASTER OF EDUCATION.

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# Abstract

This study investigates the change in metacognitive functioning of emergent readers following accelerated reading acquisition resulting from intensive daily reading instruction. Operational definitions were developed by Norman, Malicky, Leroy, Wu and Juliebo (1992) using the Componential Subtheory of Sternberg's Triarchic Theory of Intelligence to indentify responses demonstrating reading metacognition. The metacognitive categories were identifying the problem, generating solutions to the problem, using alternative representations, deciding on an order for the metacomponents/planning for the allocation of attention, monitoring the solution, and using external feedback. Students were interviewed using the Emergent Literacy Tasks (Norman, Malicky, Leroy, Wu & Juliebo, 1992), a variety of print recognition and reading tasks, before and after the reading intervention. Metacognitive responses were coded and tallied in the appropriate category.

Selected intervention lessons were audiotaped and student responses were coded in the same metacognitive categories to document the occurence of change in the students' metacognition. Few metacognitive responses were made by the children during the intervention lessons. Possible reasons for the lack of metacognitive response are discussed and suggestions for identifying metacognitive change in the intervention lessons are given.

Change in the students' reading ability, documented using the Diagnostic Survey (Clay, 1985), the Informal Reading Inventory (Burns & Roe, 1985), the Test of Awareness of Language Segments (TALS) (Sawyer, 1987) and the performance component responses on the Emergent Literacy Tasks, was significant on all measures.

Minor quantitative changes in metacognition occurred during the period of reading acquisition. Changes approaching significance occurred in the metacomponent for monitoring or evaluating the solution. Qualitative change in terms of clarity and complexity of response was observed in every metacomponent category. The metacognitive profile (responses in each category as a percentage of the total) was compared with the profile for six year old preschool children given the Emergent Literacy Tasks (Norman, Malicky, Leroy, Wu & Juliebo, 1992). The differences in the profiles for these two groups of students suggests the need for further research to identify reasons for the differences.

Suggestions include further research to determine a range of effective metacognitive profiles for emergent readers and a number of educational implications.

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Special thanks go to the teachers who participated in the project. They took time from their busy schedules to tape intervention sessions, and made their intervention logs, the children's work, and their testing results available.

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# 1. Introduction

Through the centuries the general perception of the value of reading has changed. Now, in the twentieth century, reading is considered necessary for full participation in society. According to Venezky (1991), literacy has acquired a sociopolitical or socially motivated dimension and a psychological or individually motivated dimension.

> These dimensions have developed over the past 1,000 years as literacy in the Western world changed from being the private possession of scribes and clerics, practiced primarily within the circumscribed domains of religion and government, to a near, universal tool of the masses, utilizable within every facet of daily life (p. 46).

Unfortunately, our knowledge of how to teach reading has not kept up with the need for total literacy in society. In spite of years of research into the field of reading, and the current strong emphasis on reading instruction, there are still nonreaders who have spent many years in school (Hunsberger, 1982).

Wixson and Lipson (1991) comment on the variety of perspectives from which research into reading disability has been done. Researchers, working from different perspectives such as "brain-behavior relations,...cognitive processes,...culture of education systems,...methods of assessment and instruction" (p. 539), have contributed to the overall understanding of reading disability. However, because of different perspectives and the lack of agreement on the basic issues in reading disability, there is no common understanding of causes and treatments. "There is still a need for a unified perspective on the causes and treatments for reading disability" (Wixson & Lipson, p. 564). We are beginning to understand how learning to read can seem simple for some children and difficult for others, but much more investigation is required to develop fully effective reading programs.

Within the education system, concerted efforts have been made to develop reading programs that are effective in teaching all students and to evaluate these methods. One example was a study in 1967 through the USOE First Grade Reading Studies comparing five innovative approaches, "basal plus phonics, i.t.a., linguistics, language experience and phonics/linguistics" with traditional basal approaches. The study "concluded that no approach is so much better in all situations that it should be considered the best method" (Barr, 1984, p. 548). In a more recent study Adams (1990), although recognizing the value of systematic phonics instruction, also suggested that "phonological awareness, letter recognition facility, familiarity with spelling patterns, spelling-sound relations and individual words must be developed in concert with real reading and real writing and with deliberate reflection on the forms, functions, and meanings of texts" (p. 422). Over the years there have been fashions in the teaching of reading, each being successful for many of the children who were taught with that particular program.

An overview of the changes in the research focus during the last 60 years shows that the perception of the learning process in children, in particular the process of learning to read, has undergone a fundamental shift. In 1931, Morphett and Washburne, as a result of concern for those students who became discouraged with reading in school, carried out a study to determine the optimum age to begin reading instruction. Morphett and Washburne used a combination of results to establish a mental age of 6 years, 6 months as optimum for reading instruction. The measures used to establish the criteria were intelligence tests, the child's reading progress through a fixed number of steps, and a sight word test. There appeared to be two basic beliefs underlying this study. One was that classroom instruction was the beginning of the child's reading education. The second was that a child's physical and mental growth must reach a certain maturational stage before reading acquisition can begin to occur. Although this belief did not deny the possibility that some children might learn to read earlier, Morphett and Washburne's findings indicated that the best results were obtained by beginning to teach reading at 6 years, 6 months of age.

In the sixties, researchers attempted to determine if reading success or failure could be predicted. In 1966, de Hirsch, Jansky, and Langford attempted to determine if a specific pattern of perceptuomotor and oral language deficits, at the preschool age, would predict later reading failure. The researchers wanted to develop an instrument that would identify high risk children for interventions. De Hirsch et al. gave their subjects thirty-seven tests, many of which included more than one variable. Such diverse characteristics as visual perception, auditory discrimination, auditory memory span, word rhyming, and motor coordination were just a few of the variables investigated to determine their relationship to reading failure. De Hirsch et al. did find a number of variables they considered to be "maturation-sensitive", in that the tests reliably distinguished between young, middle and old kindergarteners. In their study, 76% of these "maturation-sensitive" tests correlated with second grade achievement. Their hypothesis was that a maturational lag was a major factor in reading disability. Although the researchers believed a maturational lag was the major factor, de Hirsch et al. did not recommend the simple measure of having these children repeat kindergarten. Instead they suggested the provision of a transition year class with intensive instruction that would provide the type of learning situation needed by the children. In this research, the focus remained on determining the balance of attributes that enable a child to profit from reading instruction, certainly an admirable goal. But learning to read was still understood to begin with formal instruction in school, and reading readiness had very little to do with reading tasks.

One result of this focus on the necessary attributes for reading was the implementation of remedial programs to encourage the development of those attributes, and therefore facilitate the acquisition of reading. In the 1960s, the educational focus moved towards the development of early intervention. Two examples of this thrust were the Head Start preschool intervention program, and the perceptual-motor training program of Frostig and Horne (1964). The focus of Project Head Start, which began in 1965, was to provide disadvantaged or culturally different children with opportunities and experiences that would increase their intellectual abilities. The original program was soundly criticized because the initial increases in IQ were seldom maintained beyond second grade (Spicker, 1971). According to Cicirelli (1969), an even greater problem was that school failure in the elementary grades was not prevented by Head Start experiences. In actual fact, later evaluation of the program did show improvement on school related variables, such as lower high school dropout rates, and lower referral rates to special education for those children who participated in Head Start projects (McKey et al.,1985). The Headstart program is still in existence, but has shifted its focus to become involved with the schools and the community, and has strongly encouraged parental involvement .

In contrast to the Headstart approach, in which a population of students was defined as being in need of a program, Frostig and Horne (1964) developed a training program for individually identified children, to build those processes which researchers had identified as necessary precursors to reading. Children, who were found to have a deficit in visual perception, were given training in eye movements, in gross motor co-ordination, and in fine motor co-ordination to remediate deficits. Frostig based her remediation program on co-relational research that showed visual perceptual problems in poor readers. While Frostig and Horne's program did prove to be effective in remediating the processes, it was not successful in improving the reading acquisition of the children and, for many children, took the place of reading instruction (Hewitt & Forness, 1984). The essential point with both Project Head Start and the Frostig Training program was that one of the goals of each endeavor was to promote effective reading acquisition in the students, but the focus of the intervention, for the most part, remained outside of involvement with print, or actual reading activities.

The belief that learning to read and having knowledge related to reading began with school entry gradually became untenable. Certain researchers carried out investigations of children who entered school as readers. Durkin in 1966 and Clark in 1976 completed retrospective studies of children who learned to read before beginning systematic instruction. Their findings did not support the then prevalent stereotype that early readers were highly intelligent, or had been deliberately taught to read. Instead, their findings indicated that responsive parents or other adults, a rich literacy environment, and a curiosity about print on the part of the child, all played important roles in the reading acquisition of these children.

As Clark's and Durkin's studies were retrospective, the researchers depended on the memory of the adult caretakers for the nature of the children's interactions with print. In subsequent studies, researchers have observed children's literacy development prior to school instruction, in home settings (Bissex,1979; Doake,1981; Taylor, 1983), and in home and kindergarten settings (Juliebo,1985). Each of these studies documented the nature of the interactions of young children with their parents or significant others in their environment. A common theme throughout the retrospective research of Clark and Durkin, and the observational research of Bissex, Taylor, Doake and Juliebo was recognition of the importance of both child-initiated literacy events, and the vital role of the adult "in the interactive process as he/she acted as facilitator, controller, intervention strategist and mediator" (Juliebo, 1985, p. 286).

From his observations of preschoolers involvement in book experience, Doake (1981) reached the following conclusion about preschooler's increasing facility with reading.

> The more they were immersed in the process being used in joyful ways and the more they were permitted to participate and to use the process in approximating ways without correction, the more likely they were to be able to make progress in extending their own natural abilities to control and regulate the learning of the processes themselves (p. 571).

Bissex's (1979) study of her son documents increasing control of the reading and writing process during his preschool and early school years, and provides a longitudinal record of a child regulating the learning of the reading and writing process.

Malicky and Norman (1985) investigated young readers in kindergarten, to determine reading strategies as the children processed continuous text. The generally expressed concern was that these natural readers memorize the text and don't learn to analyze the graphic cues. In fact, the researchers' found that the readers "seemed to have gained control over top-down processes even at an early level of reading achievement ...and...also made effective use of bottom-up processes" (pp. 17-18). Malicky and Norman determined that these early, natural readers used both top-down and bottom-up processes as described by an interactive reading model.

In addition to the investigation of early readers, and environmental studies of how children interact with print and develop a control of reading, researchers became interested in investigating the actual knowledge children have of print and reading in the preschool years. Goodman & Altwerger (1981) in a study of preschool children determined that although most of their subjects did not think they could read, that all had some knowledge of environmental print, and a somewhat more developed understanding of the function of writing. Goodman and Altwerger suggested that "beginning reading and writing is a developmental process" (p. 32).

These three research strands about early natural readers, about early literacy environments, and about preschool children's levels of print awareness and knowledge about reading have evolved into a perception of reading as a developmental process, that we now term emergent literacy. Emergent literacy is considered to be the interaction of young children with oral and written language in their environment. Knowledge and understanding of children's development during the emergent literacy period is necessary for the implementation of effective reading instruction. According to Hunsberger (1982), emergent reading research indicates that "learning to read is as natural as learning to talk" with learning to read occurring through gradual participation "in a meaningful and enjoyable activity that is an important and shared part of life around them" (p. 630). This perception of learning to read is in sharp contrast to the earlier belief that reading acquisition began with formal school instruction in reading.

Acceptance of the concept of emergent literacy has had ramifications for reading instruction. For those children who become successful readers much more credit must be given to their experiences prior to school. For children who have difficulty learning to read, at least a part of the difficulty may be the result of insufficient print exposure, ineffective or absent mediation from an adult, or some other environmental factor. Reading instruction needs to be differential, building on the strengths of previous experiences of the student, with an emphasis on enriching the print experiences of those students who have acquired little print knowledge prior to school entrance.

As a result of our growing understanding of emergent literacy, the perception of how reading acquisition actually occurs has undergone a dramatic shift. However, there are still many gaps in our knowledge about how emergent literacy develops in children, and in how that development impacts on reading acquisition and reading instruction. One strand that has not been fully researched is the growth of the reader's control over the reading process and the development of the reader's knowledge about how he or she thinks about reading.

We know that many fluent readers not only read well, but make decisions while they are reading that increase their effectiveness as a reader. At a very simplistic level, when a fluent reader comes to an unknown word, he or she may omit the word, sound out the word, reread the sentence, or use any number of other strategies to identify the word. If the reader automatically chooses one option, he or she is simply implementing a cognitive strategy; if the reader makes a conscious choice of which strategy to use, he or she is using a metacognitive process. This kind of knowledge or control over our processes "allows us both to use our strengths and to be systematic and therefore efficient in our approach to a particular cognitive task" (Hunsberger, 1982, p. 630). Metacognitive processing has had considerable study with regards to the metacognitive processes of adults and older children, but has received little attention in the context of emergent literacy. Tierney (1991) completed a literature review of longitudinal studies in emergent literacy. In the review, he stated that the research to date substantiates the role of the child "as an active meaning maker constructing his or her own hypotheses in the context of daily negotiations with print" (p. 180). What the research does not show is "how such constructions are achieved. Some key factors seem to have been identified, but their interrelationship and the mechanisms students use to construct these hypotheses seem relatively undefined." (p. 180)

## Nature of the Study

It is the purpose of this study to examine the metacognitive development of one segment of the emergent reading population, in order to gain information about growth in metacognitive knowledge and processes during reading acquisition. The more knowledge we have about the reading process, including the development of metacognition, particularly in that crucial period when reading acquisition is rapidly occurring, the more responsive reading instruction can become, both in the school system and in the home. In order to help those who have difficulty learning to read, it is important to continue to add to all aspects of our knowledge about reading and learning to read.

Although most young children become fluent readers with little apparent effort, just as the majority of them master their oral language at an early age without formal instruction in speech, there are a considerable number of children who experience difficulty becoming effective readers. Researchers, continuing to investigate reading, are uncovering the complexity of the processes used by fluent readers, and are beginning to identify the interrelationships between knowledge and strategies that have to develop as children learn to become fluent readers. There are still too many aspects of learning to read, particularly with children who have difficulty acquiring the process, that are not adequately understood.

One area in which we are lacking knowledge at the present time is the development of metacognitive processes in emergent readers both before and after formal instruction has begun. In order to investigate changes in metacognition that may result during the acquisition of reading, a group of students in an intense early intervention program were followed during the period of the intervention. This intensive instruction of children in the early intervention reading program normally results in a significant change in reading levels over a short period of time. This study will determine if the gains in reading proficiency are accompanied by changes in those metacognitive processes associated with reading. The study is exploratory in nature and will investigate questions about the interconnections between reading acquisition and metacognition. It is expected that the study will provide answers for a number of important questions about the role of metacognitive processes for readers in the acquisition of proficient reading, and will provide valuable information for further studies about the reading process.

## Overview of the Thesis

This chapter has included a synopsis of the change in our belief system on how children become readers. In addition, the chapter has examined briefly the developing understanding of emergent literacy and the concept of metacognition in emergent readers, as a means of introducing the study. In chapter two, the related literature and recent research are reviewed. The first part of chapter two focuses on a review of selected historical research concerning metacognition in reading. The second part considers the important contributions of three researchers from related fields, and then deals more extensively with the recently identified field of emergent literacy. The information on emergent literacy leads into the review of the small body of research which has been done on metacognition with emergent readers. The third section provides a description of the theoretical basis of the Emergent Literacy Tasks. Part of this section will include a brief review of the literature on the Reading Recovery/Intense Early Intervention programs from which the subjects for this study were drawn. Finally the questions for the study are stated.

In chapter three, subjects, instruments, and methods are described. Data analyses are included in chapter four. Discussion of the findings with suggestions for future research are part of chapter five.

## 2. Literature Review

As detailed in the introductory chapter, in this century we have witnessed a dramatic change in our understandings and beliefs about reading. The current position on reading was perhaps best expressed by Clay (1991) as she explained the components of a model of reading acquisition.

> (W)hat the child acquired was not merely a set of information but a network of strategies for operating on or with text....(I)n order to read with understanding we call up and use a repertoire of strategies acting upon stores of knowledge to extract messages from print. Reading...acquisition involves the active construction of that repertoire, with comprehending having a central role....(I)n reading...children learn a host of things: the aspects of print to which they must attend, the aspects of oral language that can be related to print, the kinds of strategies that maintain fluency, the kinds of strategies that explore detail, the kinds of strategies that increase understanding, the kinds of strategies that detect and correct errors, the feedback control mechanisms that keep their reading and writing productions on track, the feed-forward mechanisms...that keep their information-processing behaviors efficient, and...how to go beyond the limits of the system and how to learn from relating new information to what is already known (pp. 325-326).

With this model of reading acquisition under consideration, it becomes readily apparent that extensive knowledge of cognitive and metacognitive strategies is essential to researchers, who wish to understand reading acquisition, and to teachers, who are involved in helping their students learn to read. Keeping in mind the importance of metacognition to effective reading, I will review a sampling of relevant metacognitive research in the reading field. First, I will examine research that focuses on the metacognitive processes of children over age eight. The older age groups are prevalent in studies partly because researchers have attempted to identify the metacognitive strategies in use in proficient readers. A second reason for investigating the older student group is that "while adults and older children are often sensitive to metacognitive variables, children younger than 8 years of age are less sensitive (Myers & Paris, 1978, p. 680). As will be shown, these studies do impact on the study of metacognition during the emergent literacy period.

## History of Metacognitive Research

There has been a surge of interest in the study of metacognition in the later years of this century, beginning in the middle 1970s (Haller, Child, & Walberg, 1988). However, according to Baker and Brown (1984), some researchers recognized the importance of metacognition in the learning process for much longer than that. "Researchers since the turn of the century...have been aware that reading involves the planning, checking and evaluating activities now regarded as metacognitive skills" (p. 354). Huey (1908) and Thorndike (1917) were among the first to recognize cognitive operations as integral to the reading process.

Huey (1908) was concerned with cognitive operations in the reading of young children. He began the attempt to "completely analyze what we do when we read...it would be to describe very many of the most intricate workings of the human mind, as well as to unravel the tangled story of the most remarkable specific performance that civilization has learned in all its history" (p. 6). In his research, Huey foreshadowed much of the work on emergent literacy, even though his observations were based on work with school-aged children. Huey discussed different methods of teaching children to read, identifying storybook reading and reading-like behavior as having a strong influence on reading acquisition. He also described the importance of the child's role in constructing print knowledge through play and active questioning, currently an important thrust in the emergent literacy field.

In Thorndike's (1917) early study on cognition in reading, he considered the error responses to questions which followed children's reading of a short passage. Thorndike's aim in the study in Grades 5 to 8, was "to show that reading is a very elaborate procedure, involving a weighing of each of many elements in a sentence, their organization in the proper relations one to another, the selection of certain of their connotations and the rejection of others and the cooperation of many forces to determine final response" (p. 323). Thorndike's list delineated many of the aspects of cognition and metacognition of interest to today's researchers, and underlined the complexity of the reading process for even fluent readers. The majority of the procedures Thorndike described are mental and therefore, indiscernible to the observer except through a device such as error response. Nevertheless, a lack of ability to use these procedures can result in a breakdown in the comprehension process in the competent reader, and can result in difficulty with reading acquisition in the emergent reader.

This interest in the role of cognition and metacognition in reading did not continue, as a strong behaviorist approach to learning became influential from the 1940s to the 1960s. Near the end of that period, the work of Piaget, Luria, and Vygotsky helped to shift the focus of the research interest to the importance of the mental activity of the learner "contributing to the growing influence of a cognitive approach in research" (Haller, Child, & Walberg, 1988, p. 5).

An important study of the mental activities of the learner was an investigation by Flavell, Friedrichs and Hoyt (1970) on memory. In a study of kindergarten, second, and fourth grade children, Flavell et al. studied not only the memory capacities of these children, but also what the children knew about their memory capacity. The researchers determined that the older children, who made a deliberate, reflective choice of the number of items they could memorize, had accurate knowledge of their own memory capabilities and of a range of possible strategies. Flavell called the students' knowledge of their capabilities metamemory. Of particular interest was the finding that even though the younger children were considerably less accurate in their predictions than the older students, "even the younger, 4 to 5-year-old children can predict their own spans with surprising skill" (p. 331). Although Flavell focused on the high accuracy rate of the older students, the results indicated that the 4 and 5 year old children also had knowledge of their own memory capabilities. The lesser accuracy rate of the younger children was an indication that the knowledge was less well developed, but clearly a degree of metacognition was present in the younger students.

Following this investigation of metamemory were studies that were more specific to the reading field. These studies often maintained the focus of Flavell, Friedrichs and Hoyt on the changes in metacognitive development found at different ages. However, other studies attempted to identify the differences between good readers and poor readers of the same age. These researchers wanted to determine if differences, either in the application of metacognitive strategies, or in the type of metacognitive strategies, used by good readers and poor readers accompanied the reading difficulties of poor readers. Paris and Meyers (1981) investigated the differences in the reading strategies used by good and poor fourth grade readers. In two separate multi-faceted experiments, good and poor readers were given passages to read or study, with several options available for the students if they had difficulty with the text, such as a dictionary use, note taking and question asking. The researchers monitored oral reading, recording hesitations, self-corrections and repetitions. Paris and Meyers also had a directed monitoring task in which the students were asked to underline anything they didn't understand. The students were asked comprehension questions and gave retellings of the stories. In a separate task, the students were asked to rate effective and ineffective reading strategies. The better readers showed more evidence of using metacognitive strategies when they had difficulties with reading, and also were able to identify effective strategies from a list of possible strategies more often than the poor readers. There is much convergent research in which strategy differences and metacognitive differences between good readers and poor readers are identified. What researchers have not yet dealt with is at what age do differences in use of metacognitive strategies begin, and what causes the differences in the metacognitive strategies of good and poor readers. We need to answer those important questions to learn how to promote effective strategy development at the time it first begins to emerge.

A study by Forrest-Pressley and Waller (1984), taken in concert with Flavell, Friedrichs and Hoyt's (1970) study, provides an indication that metacognitive change is indeed a developmental process. As the research efforts into metacognition gathered momentum in the late 1970s, Forrest-Pressley and Waller undertook an extensive study of good, average, and poor readers in grades 3 and 6. The researchers assessed reading skills, and the children's ability to verbalize about their use of those skills. Additionally, Forrest-Pressley and Waller investigated what they considered to be domains related to reading; namely language, attention, and memory; both from the perspective of performance, and the children's ability to verbalize their knowledge about these domains. Findings from this research were that "taking into account both performance and verbalization, the frequency of mature *metacognition* increased systematically with grade and with reading ability" (p. 117). Forrest-Pressley and Waller considered mature metacognition to require both effective performance on the tasks and a high level of ability to verbalize about the performance. The researchers go on to say "In spite of the fact that most measures increased with grade and with reading ability, it should not be concluded that the younger/poorer reader has no ability to use or talk about the skills....Rather,...the younger/poorer reader has less competence in each area than the older/better reader" (p. 120).

By 1984, the importance of metacognition had been substantially accepted. "One of the most influential trends in developmental cognitive psychology has been a growing interest in the child's metacognitive status (Baker and Brown, 1984, p. 353) Baker and Brown recognized the need for a student to be aware of his or her own limitations and the complexity of the task, in addition to being able to actively monitor the student's own cognitive activities, all activities that fall under the rubric of metacognition. "Failure to monitor can lead to serious reading problems" (p. 354). Metacognitive research can be expected to provide answers for some children who have difficulty learning to read. Certainly, more knowledge about how children use cognitive and metacognitive processes during reading could be important in identifying how the reading process works, or doesn't work for a variety of learners. This knowledge can then be used to inform reading instruction.

From the initial investigations identifying the presence of the construct of metacognition in children and adults, the differences in the metacognition of good readers and poor readers, and the developmental nature of metacognitive processes, researchers moved on to investigate the value of intervention in the metacognitive process. A number of researchers devised interventions designed to promote the effective use of metacognitive strategies, and measured their effects in a variety of situations.

Palinscar and Brown (1986) have developed a teaching strategy called reciprocal teaching. In this intervention strategy, teachers led their students in the use of the strategies of predicting, question generating, summarizing and clarifying. A critical component of the process was training the students to take over the teacher's usual role of directing the group process. For students with fair decoding skills and poor comprehension, reciprocal teaching was shown to improve their reading skills at a meaningful level. The metacognitive skills gained through reciprocal teaching transferred to other subject areas, resulting in an change in the student's percentile rankings in those subjects from the 20th to above the 50th percentile. This practical application of the metacognitive research provided more evidence that some poor readers have inadequate use of comprehension monitoring strategies and that ineffective metacognitive application can be improved. Palincsar and Brown's study did not measure metacognitive change on a discrete measure of metacognition, but relied on changes on reading measures.

In 1988, Haller, Child, and Walberg did a metanalysis of 20 studies to measure the effect of metacognitive interventions on reading comprehension. An average effect size of .71 was found, characterized by the researchers as substantial, with results indicating that "metacognitive instruction was helpful at all grade levels" (p. 8). The metacognitive strategies that were particularly effective were "awareness of textual inconsistency and the use of self-questioning as both a monitoring and a regulating strategy" (p. 8). The evidence for the importance of including metacognitive strategy training in classroom instruction was clear. Haller et al., in their article, identified the need for further research in metacognition as it applies to other content and skill areas besides reading, and in the specific components of metacognition that have the most relevance for reading.

Niemi (1990) commented on a number of studies that were similar to the earlier mentioned study by Paris and Myers (1986), investigating differential strategy use by good and poor readers. Niemi then reviewed some of the efforts to teach diverse strategies for learning such as rehearsal, elaboration, summarizing, underlining, and others. He concluded that "straightforward instruction of a specific strategic skill does not lead to a mental representation which also embraces the meaning of that skill for reading (*why and when*). In other words, the ultimate goal for metacognitive training is to promote self-awareness and self-regulation in the child's learning activities" (p. 23). Niemi then described a training study with the following steps. The first step included motivation and revision in which new skills were connected with old skills, and examples of when the new skills would be useful were given. In the second step, informed teaching instructed the children in when and why to use the new skill, with discussion and analogies stimulating the children's thinking. In the third step, the teachers modelled the skill use in both adaptive and maladaptive ways, or the skill use was demonstrated by videotapes of child actors. The demonstrations were followed with discussions. The final step was graduated practice by the students. "The aim was to bring about a progressive transition from conscious other-regulation to spontaneous self-regulation" (p. 24). Within a relatively short space of time, the research into metacognition in reading has become accessible to the classroom teacher, although much more investigation needs to be done to allow for effective implementation of metacognitive knowledge by teachers and students.

Paris (1991) discussed the value of teaching metacognitive strategies for remediation of students with reading difficulties. In this discussion, he indicated that "models of reading comprehension have come full circle to the views more prominent early in the 20th century. Now as then, reading is viewed as thinking; it is reflective, purposeful and constructive" (p. 33). This means that "evaluation of children's reading must include assessment of their thinking skills, metacognition, comprehension strategies, familiarity with topics, literacy habits and motivation" (p. 33) He identified a number of diagnostic instruments and a variety of instructional strategies that, although not simple to implement, were effective.

A longitudinal study by Mulcahy, et al (1991) compared the results of no instruction, instrumental enrichment which taught metacognitive strategies in isolation, and the SPELT program in which metacognitive strategies were taught within the content areas. The study began with students at the grade four and grade seven levels, and followed those students for a three year period. The findings in this study were that the SPELT program, teaching metacognitive strategies within the curriculum, had the most benefits for learning disabled students, particularly in the area of reading comprehension. It also benefitted gifted students to a lesser degree.

The research on metacognition in reading began in the early 1900s with Huey (1908) and Thorndike (1917). After this promising start, the behaviorist approach became very influential in the field of psychology, with the result that learning to read was primarily studied as a bottom-up process, with no focus on metacognition. Although the behaviorist approach was paramount during the forties and fifties, other researchers were developing learning theories with perspectives that differed greatly from the behaviorist perspective. These researchers developed strong theories, in which the learner was viewed as an active participant in the learning process. When research into metacognition resumed and studies of early reading were done, these theories provided a logical framework for interpretation of the new research thrust. The theoretical and practical contributions of Piaget, Vygotsky, and Chomsky will be briefly outlined in the next section.

Following the lengthy hiatus in metacognitive research, interest in metacognition resumed over twenty years ago with Flavell, Friedrichs and Hoyt's (1970) investigation of metamemory. The next development was the measurement of the presence of metacognitive activity in a variety of readers. Then, as knowledge was gained about metacognition, the focus shifted to the isolated training of metacognitive skills, a process that was generally not successful in the improvement of academic skills. In the last few years, researchers and some classroom teachers have focused on metacognitive training within the content areas. Researchers have demonstrated the relevance of metacognitive instruction for students within the curriculum, particularly in improving reading ability.

The study of metacognition has become firmly established. In addition, the importance of effective metacognitive strategy use by students in the upper elementary, junior high and high school grades is recognized. This knowledge of the importance of metacognition for reading in the higher grades has further implications for reading research. A logical extension of the current metacognitive research is to investigate the origins and early development of metacognition; the examination of metacognition in the preschool and early school years. Some research has been done in this area, but there is not the wealth of information that is available for older children and adults. Reading research in the preschool age group has been concentrated in the area of emergent literacy. The accumulating knowledge in the emergent literacy field leads naturally into the study of metacognition in young children, but, to this point, researchers have concentrated on other aspects of emergent literacy. After highlighting relevant aspects of the studies of three important researchers, the next sections will contain further exploration into the research on emergent literacy that was touched on in the introduction and will continue into a review of the metacognitive knowledge of young children.

## Research in Emergent Literacy

### Relevant Theorists

The work done by three researchers has provided a foundation for much of the knowledge that has developed in the early literacy field. The three researchers are Piaget and Vygotsky in psychology and Chomsky in psycholinguistics.

Although he did no actual work in the reading field, the pioneering work of Jean Piaget, in psychology, is relevant in describing the early reading process. Piaget described children as being active constructors of knowledge from the beginning of infancy. He believed that a child is constantly integrating "new objects or new situations and events into previous schemes" (Piaget, 1980, p. 164). This view of the child has gradually permeated the reading field. Piaget's theoretical perspective, in combination with researchers' studies of young children interacting with print, has helped educators change from viewing children as empty vessels, waiting for knowledge to be transmitted to them. Now, educators are more likely to view children as individuals who must be actively involved in constructing meaning out of the experiences they encounter in life and in school. In reading, in particular, children come to systematic instruction with differing experiences with print, and with different knowledge bases about reading. The variations in experience and knowledge occur as a result of inherent individual differences within children, combined with the differences fostered by the wide variations in the environments in which children construct their knowledge (Spiro & Myers, 1984).

The second person whose investigations and theories provided important referents for emergent literacy was Vygotsky. In his study of the development of thought and language, he proposed the idea that

> an essential feature of learning is that it creates the zone of proximal development, that is, learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in co-operation with his peers" (Vygotsky, 1978, p. 90).

This idea of learning as essentially a social activity, working most effectively when the child was learning with support from others, was considered a scaffolding process. Support given to a child while he or she was attempting to master new skills or knowledge allowed the child to work at a higher level than he or she would be able to attain independently, thus fostering optimum learning. This view of the learning process extends into emergent literacy with the interpretation that

> children acquire literacy through conversations and supported, purposeful engagements in literacy events. Closely tied to this position is the idea of *scaffolding*, in which a more knowledgeable adult supports the child's performance across successive engagements, gradually transferring more and more autonomy to the child (Sulzby & Teale, 1991, p. 730).

Another major contributor to reading was Chomsky. Although Chomsky (1965) was not involved with the study of reading processes, he had a major impact on the field of reading. He revolutionized the study of the acquisition of language through, among other things, his study of the systematic errors children make in their language. Through research in the field of psycholinguistics, he demonstrated that children are not passive learners of oral language. Children actively construct their own knowledge, making mistakes (analogous to miscues in reading) they never hear adults make, but that make sense for children who are actively learning to apply rules in language. A small part of Chomsky's evidence for viewing children as active constructors of language was the documentation of overgeneralizations that children made during language acquisition. Children, as language learners, used words they never heard anyone else say. An example of this overgeneralization was the production of incorrect regularities in irregular words, e.g. goed for went. Detailed, longitudinal observation of children as language learners was necessary to verify this now widely accepted concept in the field of linguistics.

## Emergent Literacy Background

In the late 1970s, partly as a result of this insight into oral language learning, a major shift in the interpretation of the reading process took place. Since then, many researchers have investigated how young children construct knowledge about the print in their environment. The assumption that most children did not begin to learn about reading until they entered a systemic instructional program (i.e. school) was gradually refuted with studies introducing and using terms such as print awareness, metalinguistic awareness, and early literacy. This diverse body of research was eventually unified under the term of emergent literacy (Sulzby & Teale, 1991). Emergent literacy was defined as "the reading and writing behaviors that precede and develop into conventional literacy" (p. 728). The basic idea was that just as children were an active force in the acquisition of their oral language, they also actively constructed meaning about the print in their environment. From a very early age children were engaged in literacy development. In fact the development of "reading, writing , and oral language develop concurrently and interrelatedly in literate environments" (Sulzby & Teale, 1991, p. 728). Although general acceptance of the concept of emergent literacy has developed as the result of a growing body of research, there still remain areas in which knowledge is lacking. As well, consolidation of knowledge in the emergent literacy field across methodologies and research perspectives has not been done (Sulzby & Teale, 1991).

As noted in the introduction, the concept of emergent literacy necessarily changed the focus of any researcher who was interested in investigating the origins of reading competence. In this section on emergent literacy, I will further consider the research into social interactions in emergent literacy, primarily through the research on storybook interactions between adults and emergent readers. Then, I will review research on the knowledge children have of print and reading. With each topic extrapolations to metacognition will be proposed . Finally, existent research on metacognition with young children will be reviewed.

## Storybook Research

Storybook reading plays an important role in emergent reading and therefore has been extensively studied. It is a part of the literacy environment of almost all homes, and provides a number of important elements for the child's developing literacy. Storybook reading is a structured event, with "expected social roles for participants and expected subroutines" (Sulzby, 1991, p. 276). However, Sulzby and Teale (1991) noted that the structure of the event changed as the children grew older, and characterized the change as " the parents develop a moving target of performance for children that takes into account their development" (p. 733). The eventual result for most children was that they learned to function independently with storybooks at an early age. This research on storybook reading with young children provides further evidence for Vygotsky's theory that the process of learning occurs through interaction with others, with parents using a scaffolding process during storybook reading. Parents naturally use Vygotsky's (1978) zone of proximal development in ongoing storybook reading, implementing a “moving target of performance” as noted by Sulzby and Teale (1991).

Doake's (1981) study of storybook reading with two to five year old children was mentioned in the introduction. His study involved research into the social interactions between children and adults, primarily in terms of storybooks as bedtime reading. In addition to the storybook routine recognized by Sulzby (1991), Doake noted the repeated reading of favorite storybooks at the child's request. Children frequently engaged in reading-like behavior with these favorite books as they tried to retrieve the story for themselves. It is likely that this type of independent meaning making with favorite stories may be one source of metacognitive development. As children gain print knowledge, they attempt to solve the joint problem of reproducing the story, and reconciling the story with the print. The children's efforts in independent meaning making are an example of children as constructors of knowledge, as described in Piaget's work (1980).

Juliebo's (1985) study explored an area that has received very little attention, even several years later. Researchers have rarely observed children's literacy experiences and growth in literacy as the children made the transition from home into school. Juliebo observed the children on a number of occasions in their homes, with the home observations followed by observations in the school. Her study provided an understanding of the slow-down in the literacy development of children that can result from inappropriate school experiences. Three of the four children in the study made a relatively easy transition into school, but the fourth student had difficulty connecting her previous print experiences with the reading activities in school and became more confused about reading.

Some of the child-parent interactions reported in Juliebo's study provided examples of metacognitive activity, as the child recognized a problem in his or her environment and attempted to solve the problem. This activity sometimes involved monitoring the print, usually with the help of the parent. An example of monitoring was Jeff's exchange with June. "June: Do you want a Coca-Cola? Jeff: Isn't Coca-Cola, Mom. It's Pepsi. See." (Juliebo, 1985, p. 155). Unfortunately, this type of interaction was not encouraged in the kindergarten setting. Does a non-responsive, non-interactive teaching environment affect the metacognitive growth of children negatively?

Sulzby (1985), in a two part research study, investigated the emergent reading of kindergarten and preschool children using storybooks. The children in both groups were asked to read a favorite storybook. Among the conclusions reached by examination of the children's language and interactions with the books were the following. Children progressed from treating the pages as discrete units to treating the book as the unit; the children's language in telling the story began as oral in register, eventually resembling written language; the storybook behaviors were stable for individual children when reading different storybooks; and the behaviors changed predictably with the age of the children. From these predictable behavior changes, Sulzby developed a classification scheme. Her scheme identified a developmental progression in the independent book reading behavior of children, from the lowest level of refusals and/or dependent reading, to the highest level of reading governed by print.

In a study by Pappas and Brown (1987), children were asked to "read" the same unfamiliar storybook three times. Each time, the storybook had just been read to them with the researcher providing answers for any of the children's questions. Consistently, in the three readings, the children developed closer approximations of the story structures in the text. After examining the nature of the extrapolations and approximations made by children as they read storybooks, Pappas and Brown (1987) reached the conclusion "the ontogenesis of the registers of written language appear to be just as much a constructive process as we have seen in other areas of children's cognitive/linguistic development" (p. 175). In other words, children reading storybooks reconstructed the text, combining their knowledge of story schema with print and picture cues to produce their own rendition of the text. The children's renditions showed gradual convergence to the actual text. This process paralleled that occurring in language learning and cognitive development in other areas, with children actively attempting to generate appropriate meaning, rather than using rote recall of the story.

The accumulating research on the dynamics of storybook reading with young children has demonstrated the influence of storybook reading on children's acquisition of literacy. Various studies have shown differences in the way storybooks are read to children, with some patterns of interaction being thought to be more desirable. A study by Whitehurst et al. (1988) was designed to determine if parents' style of storybook reading had an effect on children's language skills. The parents in the experimental group were given training in effective interaction strategies such as evocation, informative feedback, and gradually changing the standards for the children. The researchers concluded that variations in reading style could have an appreciable effect on language development, as the experimental group surpassed the control group by six to eight months on several language measures. Does this kind of interaction develop metacognitive strategies in the child? The study did not focus on that aspect of reading, but the answer would likely be yes.

As children reconstruct the meaning of stories, making closer and closer approximations to the print in the storybook, there is considerable possibility, that at least at times the children are using metacognitive processes in the "reading" of the story. According to Pappas and Brown (1987), the "readings" are not rote. The studies that have examined changes in young children's reading behavior in storybook settings, have pointed to the interactive role of the parent and child as a factor in facilitating growth in the child's acquisition of literacy. The studies also have documented the purposeful behavior of the child during the process of reading storybooks (Doake, 1981; Pappas & Brown, 1987; Sulzby, 1985). Studies of storybook interactions have demonstrated a scaffolding process, in which the adult and child gradually progressed from typical oral language interactions, to situations where large parts of the text were read verbatim. The observations and conclusions in the storybook research are compatible with the theories of Piaget viewing the child as an active constructor of knowledge, of Vygotsky viewing learning as occurring within a social framework with scaffolded interactions with adults or peers, and of Chomsky viewing the child as generating rules and then applying them in other situations. The developmental changes reflecting increasing levels of sophistication in literacy interactions likely reflect cognitive and metacognitive development within the child.

In an study which combined elements of storybook reading and the next topic, which is children's knowledge of environmental print, McGee and Richgels (1989) examined young children's acquisition of alphabet knowledge. From observational studies of children and retrospective reports of parents, the researchers determined that alphabet learning was a part of the literacy involvement of the children, and that letters became part of an interactive routine between the parents and the child, often initiated by the child. However, the routines had usually been introduced by the parents, albeit in a casual, unplanned way. Learning about the alphabet often occurred from interactions with environmental print, or when the child participated in an adult's writing activities.

## Environmental Print Research

Researchers have examined the knowledge young children have of environmental print, a study separate from the investigations into storybook reading, but with equal relevancy to the emergent literacy field. Determining preschool children's reading knowledge through the use of conventional reading tests would result in the erroneous information that most children had very little awareness of and knowledge of reading. The use of environmental print allows assessment of the child's knowledge on items with which he or she normally has had considerable experience, providing a much different picture of children's reading knowledge. The researchers in this domain have focused on the reading children can do, and the amount of contextual information necessary to support the reading. As well, researchers usually examine children's knowledge about reading.

In an early study, Mason (1980) assessed the print knowledge of four year olds throughout the nursery school year. Not unexpectedly, different children had differing amounts of print knowledge at the beginning of the year. All children had increased their print knowledge by the end of the year. Mason identified a hierarchy of print knowledge acquired by the children. In the first stage, which she called recitation, letters were named and printed; in the second stage, signs and labels were read; in the third stage, nouns and function words were read with attention directed to letter information; and in the fourth stage children recognized multisyllable words and abstract nouns. At this age, very few children reached the fourth stage. Mason suggested print knowledge was built through the attempts by the children to form "scripts about what reading is and how it is executed" (Mason, 1980, p. 222). Mason postulated that children used letter knowledge and sign reading experiences as "guidelines for experimenting with simple reading and spelling tasks. As hypotheses are formulated and rejected or accepted, children discover more effective ways to discriminate and remember letters and words" (p. 222). If her theory is indeed correct, this type of a learning scenario would provide many opportunities for metacognitve monitoring to develop. The kind of activity suggested by Mason would require the child to make frequent judgements about the appropriateness of his or her information.

Goodman and Altwerger's (1981) study measured the print awareness of three, four and five year old children. The researchers determined that children at all three ages had awareness of environmental print, but many children relied heavily on the context to help them identify the print. The children's responses to environmental print tasks varied considerably, from exact renditions of the print, to appropriate generic responses. When children were shown print out of context, they generally responded inappropriately even though they had identified the same print in context. Children in the study did not feel they could read and were unable to describe reading, but were willing to write and could generate reasons for writing. The children did have a sense of story, and knowledge of the form of print (letters, words, etc), but had little knowledge of the function of print in books. Goodman and Altwerger found a development process with older children having more knowledge than younger children, although the age differences varied with the task.

In research with Spanish speaking children in Brazil, Ferreiro and Teberosky (1982) investigated the knowledge four to six year old children have about reading and writing. With a series of clearly defined tasks, they identified children's levels of knowledge. In the earliest level, the child sees the picture and print as being undifferentiated, with the text representing the same elements as the picture. The highest level identified in their sample was with the child searching for one-to-one correspondence between graphic and sound segments. Ferreiro and Teberosky concluded that children's hypotheses about print change over time as the children gain more experience with print, and their original hypothesis becomes untenable, a conclusion very similar to the one espoused by Mason (1980). This study represents an important view of trying to understand literacy from the child's perspective, rather than the conventional adult educational perspective, a difficulty in some of the early studies on young children's metacognition.

The next group of studies usually have a print awareness component to them, but the primary focus of the studies is on the child's knowledge about reading. Many of the studies explicitly discuss metalinguistics or metacognition.

## Metacognitive Research in Young Children

Research on emergent literacy has demonstrated the importance of literacy experiences and the importance of mediation by adults in fostering the development of literacy in young children. For the most part, it leaves unanswered questions about the cognitive and metacognitive operations of young children in the emergent literacy context. Tierney (1991), in a review of the literature on longitudinal studies in emergent literacy, recognized that research substantiated the role of the child "as an active meaning maker constructing his or her own hypotheses in the context of daily negotiations with print" (p. 180). What the research did not show was "how such constructions are achieved. Some key factors seem to have been identified, but their interrelationship and the mechanisms students use to construct these hypotheses seem relatively undefined" (p. 180).

One of the first studies into what young children know about reading was done by Reid (1966). Five year old children were interviewed three times during the year, and asked questions about reading and writing. The children progressed in their ability to interact successfully with print, but, especially at the first interview, had little understanding of what reading was, or of the purpose of reading. As was found in the study on environmental print done by Goodman and Altwerger (1981), children's knowledge of writing was more advanced.

Downing (1969) basically attempted to replicate Reid's (1966) study. However, he recognized the difficulty children have in responding to general questions. Downing provided a context for the children's answers by utilizing representations that were more concrete in nature. He used items such as a toy bus with a number and destination boards when he asked children how their mother knew which bus to take, and an opened book when the children were asked what their parents read. The children were able to demonstrate understanding and awareness of strategies more easily in this situation.

However, an inspection of the tasks involving knowledge of what reading is showed that questions were most often posed to children in a high level explicit definitional state - " What is reading?" - as opposed to setting up tasks in which the child's implicit knowledge or understanding of the reading task could be identified on a number of incremental levels. Downing's (1969) comment about the normal course of development in children's thinking made this exact point : "Actual understanding comes first, while ability to verbalize about it naturally comes later" (p. 222).

Hiebert (1983), in her study of three to five year old children's reading knowledge, moved considerably beyond the first two studies by providing specific examples for the children. She had an adult demonstrate three different conditions, oral reading, silent reading and looking at the ceiling. The children were asked to explain what the adult was doing. When the children were asked what was read in a book, they were shown books with text, with pictures and text, with pictures, and with blank pages. Hiebert's studies identified the children's knowledge more precisely. She found that all the children were very accurate in identifying their own reading ability, that the majority of children could identify the reading activities, and that the ability to identify what was read on the page increased with the age of the children. However, her focus was still on identification of those aspects of reading that children ought to know, instead of on exploring the knowledge children do have in order to determine how to extend that knowledge for optimum reading acquisition.

This focus on what children need to know to learn to read as determined from an adult perspective was prevalent in Yaden's review of the studies on metalinguistic awareness. Much of the research with children in the three to seven year old group focused on metalinguistic awareness or the "ability of young children to consciously and deliberately reflect upon and analyze the structure of both oral and written language as opposed to merely reacting to its content" (Yaden, 1984, p. 5). Metalinguistic awareness reflects only a part of metacognitive and cognitive ability, and according to Yaden's definition required not only awareness on the part of the child, but an ability on the child's part to verbally describe his or her understanding of the process. According to Yaden's analysis

> beginning readers are largely unaware of the overriding structure of the writing system as well as their own speech. They have disparate notions as to what behavior comprises the act of reading and the necessary steps that they must take in getting ready to become a reader (p. 34).

In fact, studies of metacognition were eliminated from his analysis of the studies of metalinguisitic knowledge. An ability to understand and use a process with some effectiveness often precedes the child's ability to explain the rationale or label the process. Therefore, it can be expected that studies measuring the children's use of metacognitive strategies will have more positive results than those studies that require knowledge of the language terms used in reading.

The differences in children's levels of metalinguistic knowledge has been identified through studies of phonemic awareness. This subset of metalinguistic knowledge has received considerable attention in recent years, with particular emphasis on the influence of phonological awareness on reading acquisition (Bradley & Bryant, 1978, 1983). In a study of the relationship of various forms of phonological awareness by Bryant, MacLean, Bradley, and Crossland (1990), the researchers determined that "[s]ensitivity to rhyme and alliteration are developmental precursors of phoneme detection, which, in turn, plays a considerable role in learning to read" (p. 437). Tunmer (1992) suggests "that letter to phoneme knowledge, not phoneme to letter knowledge...is primarily responsible for 'driving' the development of word recognition skills" (p. 203).

The early researchers reported an apparent absence of metacognitive functioning in young children. Reid (1966), and Downing (1969) concluded that "Young beginners have serious difficulty in understanding the *purpose* of written language" and "have only a vague idea of how people read, and they have a particular difficulty in understanding *abstract* linguistic terminology" (Downing, 1969, p. 225). Yaden (1984) concluded that "research into metalinguistic abilities...has turned up overwhelmingly negative results in documenting children's awareness of spoken and written language units" (p. 40). These observations were essentially negative, partly because of the design of the instruments, and partly because of the focus of the researchers on metalinguistic knowledge. This negative view of children's literacy potential is not congruent with observations of children in the emergent stages of literacy development.

That this problem with the research was recognized was clear from Mason's (1984) study of preschoolers' self-regulative behaviors. Her study took place in a preschool setting and the principal goal "was to test the claim that self-regulative behaviors appear in conjunction with tasks that are at an appropriate level of difficulty and foster reading" (p. 24). At two points in the year, Mason videotaped story reading sessions with groups of four year old children, and analyzed the responses for metacognitive components. The barely audible responses and nonverbal responses were also compared. There was a considerable increase in the overt metacognitive responses in the second session. Even more interesting was that analysis of the tapes for the first session was "found to contain private or inconspicuous attempts to behave similarly to the teacher....(I)t appears that the children's nonverbal responses were important precursors to the more clearly identifiable metacognitive verbalizations that occurred in the April lesson" (Mason, 1984, p. 38).

Rowe and Harste (1986) analyzed the language used by children in a number of different contexts on four different parameters--graphophonic, syntactic, semantic and pragmatic knowledge. Rowe and Harste found evidence of knowledge and use of all four cuing systems, mostly in the children's language about reading and writing activities, but sometimes through self-correction or a change in strategy use. The researchers, when assessing metalinguistic awareness in young children, found that even when presenting different children with exactly the same tasks

> the 'demonstration potential' differs according to the particular needs, experiences, and purposes of the language user....The demonstration potential of each literacy event changes as the language user moves through cycles of interest, and these interests are likely to be influenced by past experience as well as current situational constraints (p. 254).

Rowe and Harste went on to say that "metalinguistic knowledge is potentially unlimited because it is dependent on the experiences of the language user" (p. 255).

A study done by Freppon (1989) examined the differing experiences of the reader by comparing the differences in children's concepts about reading. Grade one children from different instructional settings, literature based and skill based, were matched carefully on a number of different variables, in addition to being matched on reading level. Near the end of the school year, the children were assessed in terms of reading ability and metacognitive knowledge. Both groups of children used the graphophonic relationships in print in their reading, with the literature based group using graphophonic strategies more successfully, and being more likely to use other reading strategies. To assess metacognitive strategies, the children were interviewed and given passages with incomprehensible print to read. The literature based instruction group were significantly more likely to reject the incomprehensible print. "The literature group exhibited breadth in their understanding of the purpose and nature of reading during interviews, balance in their use of cues available in the text, and an active search for meaning as they read orally" (Freppon, 1989, p. 19). This type of study comparing the impact of differing instruction on metacognitive processes is very informative about just how metacognition develops in young children, and about the role metacognition plays in reading acquisition.

A study was done by Norman, Malicky, Leroy, Wu, and Juliebo (1992) with the metacomponents and performance components identified in Sternberg's Triarchic Theory (1985). Once operational definitions were determined for the metacomponents, children from three to six years of age were interviewed using a series of tasks (Emergent Literacy Tasks) designed to elicit metacognitive statements. The researchers were able to identify metacognitive statements in children at all ages. Norman et al. found a general increase in the metacognitive processes of children as their age increased, but with shifts within the metacomponents, perhaps as the children changed from general to more specific operations.

These studies on metacognition in young children, although somewhat limited in number, have increased the understanding of metacognitive development, and have begun to provide an indication of the role metacognition plays in reading acquisition. Further investigations are needed to continue developing our knowledge of emergent literacy, investigating a broad model of thinking which includes metacognition as one of the components of emergent literacy. It is important to explore the range of metacognitive operations evident in young children in the emergent stages of literacy development. A knowledge of the usual pattern of metacognitive development during the early stages of systematic reading instruction can increase the knowledge of reading processes, and may make reading instruction more effective.

The educational intervention studies discussed earlier by Palinscar and Brown (1986), Haller, Child and Walberg, (1988), and Mulcahy, et al (1991) provided a strong indication that imbedding metacognitive strategies in the curriculum content areas improved student performance on reading and other curriculum measures. These studies were done with older students, but the evidence is beginning to accumulate that it is important to foster metacognitive competence at earlier stages of reading acquisition, as well.

This study will use the Emergent Literacy Tasks developed by Norman, Malicky, Leroy, Wu and Juliebo (1992) to investigate metacognitive change during a period of reading acquisition in early school age children. Students will be those participating in an Intense Early Intervention program, to ensure that their reading acquisition level increases significantly. The next section will explain the relevant sections of Sternberg's Triarchic Theory as it is applied to the Emergent Literacy Tasks. The following section will provide information on the Intense Early Intervention program. At that point the focus of the study will be described.

## Background for Study

### Theoretical Basis of Emergent Literacy Tasks

As with studies of cognition and metacognition, models of thinking skills have been available for many years. Although more systematic in the past 25 years (e.g. Bloom, 1956, Guilford, 1976), models of intelligence (Sternberg, 1985) have become more inclusive, placing thinking skills within a situational context. As Sternberg's componential subtheory included a broad cross-section of cognitive and metacognitive operations that seemed to have potential to describe the thinking of young children, the components have been operationalized to apply specifically to reading. Although Sternberg primarily applied his model to the thinking of adults, Clements and Nastasi (1989) utilized Sternberg's model for describing the thinking of eight year old children working on computer math questions or turtle geometry.

In Sternberg's Triarchic Theory, he endeavored to "specify the mechanisms by which intelligent performance is generated" (1985, p. 97). Although the complete theory has three major components, for purposes of this study only the componential subtheory will be considered, as the experiential subtheory and the contextual subtheory are not as relevant to this research.

According to Sternberg's model, within the componential subtheory, "there are three main types of components, serving three different kinds of functions" (p. 97). The higher-order executive processes used in planning, monitoring, and decision making in performing a task involve metacomponents. He identified seven metacomponents, one of which is the "decision as to just what the problem is that needs to be solved" (p. 99).

The performance components formed the second category. They are used in "the execution of various strategies for task performance" (p. 105). Although there are many, he identified three as being of major interest and importance. An example of a performance component is the encoding component, concerned with the initial perception of and the storage of new information.

A third category was formed by the knowledge acquisition components used in gaining new knowledge. Sternberg identified three major components in this area, one of which is selective encoding. During the process of selective encoding, the individual is involved in recognizing which part of the massive amount of information presented is relevant to his/her purpose.

Although Sternberg has not applied his model specifically to the reading process, Norman, Malicky, Leroy, Wu, & Juliebo (1992) have operationalized the metacomponents, performance components, and knowledge acquisition components for the reading process (see Appendix A & B). A pilot study utilized the data from a dissertation (Juliebo 1985) "to determine the utility of Sternberg's categories and subcategories for describing the thinking of young children engaged in emergent literacy activities" (Norman et al, 1992, p. 89).

The results from Norman et al's study of preschool children indicated that these components were reflective of children's emergent literacy abilities, and that the components were not in a state of existence or non-existence. There seemed to be a continuum from occasional signs of use to the gradual development of consistency and independence in the use of the operations. This finding was consistent with the findings of Rowe and Harste (1986). "Our exploration of the metalinguistic awareness of young children indicates that it is not a monolithic entity." It "is sometimes discussed as if it were an all or none proposition...they possess a diverse array of metalinguistic concepts and strategies and...the nature of this metalinguistic knowledge depends on their interests, experiences and purposes for using language" (p.254).

A further step in this ongoing investigation is to use the Emergent Literacy Tasks with emergent readers over time to identify changes in metacognition that occur as reading acquisition occurs. To accomplish this goal, children in intense early intervention programs will be tested before and after an intensive period of systematic reading instruction to assess changes in cognitive and metacognitive functioning.

A more detailed explanation of the metacognitive and performance components is given in the next chapter on methodology. The following section reviews the Intense Early Intervention program, with reference to the results normally obtained by the program in reading acquisition.

## Intense Early Intervention for Young Readers at Risk

The students for this study were selected by teachers implementing the Intense Early Intervention program, based on Clay's (1985) Reading Recovery program. The Intense Early Intervention program has had similar results to Reading Recovery programs with students ready to be discontinued from the program after an average of 13 weeks (Alexander et al, 1988-89). As there is little documented information on the results of the Intense Early Intervention program, information on its effectiveness will be based on the literature from Reading Recovery programs.

There is accumulating evidence of the effectiveness of the intervention in Reading Recovery programs. The reports of success by Clay (1985) have been supplemented by reports from Reading Recovery projects in Ohio. Lyons (1987, 1988), in an analysis of changes in children labelled learning disabled, found that learning disabled children began with a focus on the sound-symbol cuing system, and were successfully taught to use multiple cuing systems. The other children eligible for the Reading Recovery program already used the other cuing systems, but tended to ignore visual/auditory information. Lyons found the learning disabled students required fewer intervention sessions, with the majority of them becoming average readers, indistinguishable from their classmates. Examination of one teacher's lesson plans revealed a focus "on teaching strategies for searching for meaning and structural cues" (Lyons, 1987, p. 16). Lyons (1991) reports that 85% of children discontinued from the Ohio Reading Recovery programs, including those students who had been classed as learning disabled, reached the average reading level of their classes and maintained that level through the fourth grade (Lyons, 1991).

Pinnell, Lyons, DeFord, Bryk, and Seltzer (1990-91) report on an extensive study comparing results from a variety of group and one on one intervention programs. Reading Recovery was the only program with significant results on all the reading measures. Another study by Tunmer (1992), although reporting "that Reading Recovery can be a highly effective intervention program" (p. 214), demonstrated that an identical program with systematic rather than incidental instruction in phonological recoding was more effective in that the number of lessons required to reach the discontinuation criteria was significantly reduced.

The excellent results obtained from this type of one on one program, with intensive daily tutoring, can be expected to result in significant reading acquisition for the students in this study.

## Focus of the study

From the literature review, it is clear that reading itself and learning to read are highly complex processes. Although we have gained more knowledge about the reading process, particularly in this century, this knowledge has still not enabled us to teach one hundred percent of the children in our classrooms to read in a reasonable span of time. Those children who do not successfully learn to read early in their schooling often become discouraged learners.

The developing field of emergent literacy has provided considerable evidence of children interacting with print as constructive learners, and scattered studies have shown evidence of young children as being metacognitively active. The pattern of metacognitive implementation in beginning readers is basically unexplored. Knowledge in this area could have considerable impact, both on our understanding of the processes in learning to read, and on the instructional methods used with beginning readers.

With this background in mind, the first question to be examined by this study is:

1. Is progress in the acquisition of reading accompanied by a change in metacognitive responses? If there is a change, is it identifiable as an increase in metacognitive responses, a change in the quality of responses, or a combination of increases and decreases in the different metacomponential categories?

An important aspect of the study of metacognition is the determination of how children acquire metacognitive strategies. A difficulty with studying the acquisition of strategies is that most metacognitive activity is indiscernible as it is primarily a mental activity. However, a goal of the Intense Early Intervention program is to promote the effective use of cognitive and metacognitive strategies. Therefore, the second question for this study is:

2. Can changes in the use of metacognition by the children be documented during the intensive reading instruction?

The first two questions represent the major focus of the study, with question one being the most important. However, in order to adequately address the areas of interest in the study, it is necessary to ensure that the subjects of this study have progressed significantly in the acquisition of reading. As the early intervention program itself has well documented measures for determining improvement in reading competence, the results of those measures, taken before and after the intervention, will be examined at the beginning of the results chapter. Documentation of the changes in reading will respond to this third and minor focus of the study.

3. Did the intense early intervention program result in changes in objective reading scores of the students participating in the study? Did the intense early intervention program result in an increase in the students' phonemic segmentation ability? Did the intense early intervention program result in the use of the performance components on the Emergent Literacy Tasks and during the intervention lessons?

In fact, because of the logistical need to document a change in reading ability, and the fact that examining the teacher interventions follows logically after this documentation, the most important focus of the study, the area of metacognition will be the last section discussed, both in the chapter on methodology immediately following, and in the chapter in which the results are presented.

# 3. Methodology

This chapter will describe the process used to obtain permission to access students in the Intense Early Invention program, characteristics of the subjects, the procedures followed during the study, the data collection process, the instruments used, and analysis of the data .

## Access to the Intense Early Intervention Program

Through a workshop given by Dr. Moira Juliebo on the Intense Early Intervention in Young Readers at Risk program that she was directing, I made initial contact with the intervention teachers in two school boards. I made a brief presentation to acquaint the teachers with the study and encourage them to participate in the study with their next group of students.

The proposal for the study was submitted to the administrators responsible for approval of research projects in the three local school boards currently running an early intervention project. Approval was granted by all three school boards. At that time, a preliminary contact was made with the Reading Consultant of the third school board by Dr. Charles Norman and me, to present the study objectives and requirements. With the consultant's help, we also met one of the teachers involved in the program, and explained the research process to her.

At individual meetings with each interested teacher, I described the responsibilities of each participant in the study--the intervention teachers, the students and me. At that time I gave them an information form (see Appendix C) for the parents of the participating children. It contained a consent form to be returned to the intervention teacher, agreeing to the child's participation in the study. Dr. Norman's phone number and my phone number were included on the form. Two parents did call for more detailed information regarding the study and were reassured about their child's participation.

Every teacher who was willing to participate in the study was included, and all the students with whom they worked. The only exception was the last teacher to join the study. She chose three of her six students to participate in the study. Some of the teachers contacted felt unable to participate, because they were new to the early intervention program, because their interventions began before permission for the study was obtained, or because their work load was just too heavy. Those teachers participating in the program had a high level of interest in the study.

## Selection and Description of Subjects

The selection of the students for the early intervention program was done entirely by the school and each of the intervention teachers. Their criteria for selecting students for the intervention program included the following:

1. For this session, the students were in grade one, some for the second year, and were not making adequate progress in reading.
2. Information from the Diagnostic Survey (Clay, 1985) and an informal reading inventory (Burns & Roe, 1985) were used to determine those students most in need of intervention by each school.
3. Parents were contacted for their consent to the program, and were required to agree to work daily with their child on the reading material sent home from the school.

The students in the study were white, with an age range from 6 years, 1 month to 7 years, 5 months at the beginning of the intervention. Three of the students were repeating grade one, with two moving from a French Immersion to a full English program. There were six female and five male students in the study. Four of the five schools were situated in outlying suburbs, the fifth was in a reasonably central but not core area of the city.

Once the student selection was in place for the early intervention program, parents were asked for permission to have their children participate in this study.

## Description of Study Procedures

Once the permission slips were returned by the children, I saw them for a one hour session in which I gave them the Emergent Literacy Tasks (Norman, Malicky, Leroy, Wu & Juliebo, 1992), the Concepts of Print test

(Clay, 1985), and the Test of Awareness of Language Segments (Sawyer, 1987). This session was audiotaped, and the tapes transcribed. Following the transcription of the Emergent Literacy Tasks, the child's responses were coded using the operational definitions of Sternberg's metacognitive and performance components described later in this chapter.

During the testing session, I informed the children that I would come back and ask them the same questions again in about two months and that, in the meantime, the teacher would sometimes make a tape recording of their lessons. I explained to them that I was interested in how their teacher was teaching them, in how they were learning to read, and not in how well they were reading. The children were co-operative throughout the testing.

I was given copies of the battery of tests done prior to the intervention by the participating teachers. This included a preprimer informal reading inventory (Burns & Roe, 1985) and the Diagnostic Survey tests from Clay (1985).

I asked the teachers to audiotape intervention sessions, taping all of the Roaming Around the Known section (an exploratory period at the beginning of intervention, approximately two weeks in length) and then continue taping one session of their choice each week. Every two weeks, I collected audiotapes and copies of the intervention log records from the teachers, and left them blank cassettes for future sessions. The duration of the intervention period varied from 12 to 16 weeks for the different students.

Finally, with the intervention finished, the teachers repeated the informal reading inventory and the Diagnostic Survey tests. I repeated the Emergent Literacy Tasks, the Concepts About Print test, and the Test of Awareness of Language Segments, again audiotaping and coding the resultant responses.

## Instruments, Administration and Rationale

### Diagnostic Survey

The Diagnostic Survey was used by the teachers to determine the student's need for the program and to provide a baseline for measuring the success of the intervention program. It was developed by Clay (1985) for use in the first year of school "particularly with children at the end of that first year, (it) tries to get away from the concept of tests, and is closer to criterion-referenced assessment" (p. 16). In addition to raw test scores, Stanine scores are recorded to compare the different tests in the battery and for pre and post intervention comparison purposes. This survey is valuable for the intervention teachers. In addition to giving information about the child's reading ability, the tests are also used to determine students strengths, weaknesses, and strategy use in reading. From this information, the specific intervention for that child is planned. As well, the Diagnostic Survey is valuable for the study because it provides information about specific knowledge and skills of the child. Such things as knowledge of the alphabet, sight words, and the ability to represent phonemes heard in speech with a matching written letter are some of the areas tested. The Survey is sensitive to changes in these aspects of the child's reading knowledge.

The separate tests in the Diagnostic Survey are described below. With the exception of the Concepts about Print test given by the researcher, the remainder of the Diagnostic tests were given by the intervention teacher or a reading consultant.

1. Letter Identification: In this test the child is asked to identify the letters of the alphabet, both upper and lower case, along with a common variation of 'a' and 'g'. The letters are not presented in alphabetic order and a correct response is recorded if the student gives the letter name, the letter sound or the name of a word beginning with the letter. The child is asked questions prompting any of these responses, if he or she does not respond. The highest possible score is 54.

2. Ready to Read Word Test: This test contains three lists of 15 words, plus one practice word, originally chosen from the 45 most frequently used words in the New Zealand *Ready to Read* series (1963). The child reads one list and can be given an alternate list for posttesting purposes. The maximum score is 15. This test is an indication of the child's sight word vocabulary.

3. Writing Vocabulary: The child is given a blank piece of paper and pencil and is instructed to write all the words he or she knows, starting with the child's name. The examiner prompts with simple words and categories of words if the child stops writing. There is a time limit of ten minutes which the child is encouraged to use. There is no maximum score on this test.

4. Dictation Test: Simple sentences are dictated very slowly to the child, emphasizing the sounds in the words if necessary. The child writes as much of the sentence as possible, and is given credit for each correct sound represented, rather than for actual correct spelling.. There are five sets of sentences to choose from, with a total of 37 sounds each. This test helps determine the child's ability to analyze and represent spoken language in writing.

5. Analysis of Writing Samples: Three samples of the child's writing from different days are analyzed from a level of one to a level of six, for three different features of written language. An average score from the three different samples is determined. The first analysis is language level, from writing containing letters but no words, through to a paragraphed story. The second analysis is on message quality, from the use of signs and symbols, to recording his or her own ideas, to a successful composition. The third analysis concerns directional principles, including spaces between words, as well as left to right orientation in writing.

6. Concepts about Print: This test involves the reading of one of two books specially developed for the test by Clay (1972, 1979). As the examiner reads the book, the child is asked to identify specific items about the text, such as identifying where to start reading; using masking cards to identify a word, letter, and an upper case letter; and identifying specific punctuation. There is a total of 24 items on the test.

## Informal Reading Inventories

The other test used by the intervention teacher was an informal reading inventory. Most of the teachers used the Informal Reading Inventory (Burns & Roe, 1985), one used the Alberta Diagnostic Reading Program (1986). The passages used with these students were the PrePrimer as a pretest, and the PrePrimer and Primer as a posttest. For most students, the oral readings were analyzed for the percentage of words identified correctly. A second measure was the child's ability to answer standard comprehension questions about the passage. One student was given a posttest measure that involved reading an predictable book, which was then analyzed for word recognition.

## Test of Awareness of Language Segments (TALS)

This test was included to determine if there were changes in the phonological segmentation ability of the students following the early intervention program. The TALS (Sawyer, 1987) was designed for children from four to seven years of age and tests the child's ability to represent phonological segmentation using colored blocks. In the first of three sections (A), the child uses colored blocks to represent the words in sentences of increasing length. In the second (B), the child represents syllables in individual words from one to three syllables in length, and in the third (C), represents phonemes in individual words. Each component has a training segment before the actual testing begins. If the child does not master the training segment, that section of the test is discontinued. If the child is older than 5 years 6 months, he or she is only tested on Part B if unsuccessful on Part C.

## Emergent Literacy Tasks

The Emergent Literacy Tasks (Appendix D) were developed by Norman, Malicky, Leroy, Wu, and Juliebo (1992). The tasks were set up to "challenge children to solve literacy problems while eliciting talk about what they knew and what they were doing" (p. 89). For the purpose of this study, the original tasks were modified by eliminating the written segments of the tasks, as well as the tasks that were to be done co-operatively with two children. The retained tasks are primarily reading related tasks. The different sections are described below.

1. Reading Interview: The interview has two sections. In the first part, the student is shown a picture from the *Linguistic Awareness in Reading Readiness Test* (Downing, Ayers, & Schaefer, 1983), is asked to tell about the picture, and then is asked specific questions about those people who are reading and writing in the picture. In the second section of the interview, the child is asked about his or her own reading and about the reading of others.

2. Magazine Task: In this task the child is shown a page in a children's magazine with puzzles that involve words, symbols and pictures. The child is asked a variety of questions about the different items and is given the opportunity to read a portion of the text.

3. Readability Cards: This task was drawn from the work of Ferreiro and Teberosky (1982). The child is shown nine cards each containing symbol(s), letter(s), word(s), or a sentence. The child is asked if anyone can read the card, and then is asked for a reason for his/her answer.

4. Environment Objects, Pictures, and Logos: In the first of these tasks, the child is presented with an object containing print, and is asked about the object and the print. In the second, the child is asked for the same information about a picture of a street scene, or a picture of a store front containing environmental print. In the third task, logos from the previous two tasks, divested from their context, are shown to the child. The child is asked the same questions as described for the objects and the pictures. These tasks are based on the work of Brailsford (1985), Doake (1981), Goodman and Altwerger (1981), and Harste, Woodward and Burke (1984).

5. Book Knowledge: In this final task, based on the work of Brailsford (1985), Clay, (1985), and Doake (1981), the child is given a predictable book (Brown, 1981), and is encouraged to participate in the reading of the book. For the last part of the book, the child is asked to listen to the researcher read and determine if she is reading correctly.

As these tasks have been developed recently, and used in an exploratory study, there is no data on validity or reliability available. However, each task has a clear connection with reading.

## Operational Descriptions of Sternberg's Metacomponents and Performance Components

### Metacomponents (MC)

"*Metacomponents* are higher-order executive processes used in planning, monitoring, and decision making in task performance" (Sternberg, 1985, p. 99). According to Forrest-Pressley and Waller (1984) "metacognition is a construct that refers, first, to what a person knows about his or her cognitions and second, to the ability to control these cognitions" (1984, p. 6). To indicate a metacomponent, a statement must be explicit and must indicate *awareness* and /or *control over reading or writing processes*. These include statements explicitly indicating the identification of a problem or problems (MC1), planning what to do or what could be done (MC2), using alternate representations (MC3), deciding on an order for the other metacomponents or planning for the allocation of attention (MC4/5), monitoring a solution (MC6), or using external feedback (E). In contrast to the other metacomponents, however, monitoring is often inferred through behavior.

1. Defining the Problem (MC1): Statements related to defining the problem include: references to reading and writing (and learning how to do so) as purposeful, evaluative statements implying a purpose for reading, general references to one's ability, reference to problems with respect to specific tasks, reference to reading and writing as having specific criteria or demands

related to knowledge of what reading and writing are, and recognizing the need to know how to read.

2. Generating steps to a solution (MC2): This metacomponent includes statements about the types of things one can do to read or write such as the following: restricting the content as well as delimiting the task (ie. deciding to focus on one aspect of it), references to what one does to read and write or to learn how to do so, references to learning and teaching reading or writing, and references to practice as a way of learning how to read.

3. Using alternate representations (MC3): This metacomponent includes statements that explore and compare alternate representations of information across reading and writing, with evidence that it is being done to examine goals and strategies.

4. Deciding on an order for the other metacomponents/Planning for the allocation of attention (MC4/5): This metacomponent includes statements referring to sequencing in time the steps mentioned in M-2 or M-3 and statements referring to the allocation of one's attention. Included are comments indicating organization of one's strategies and actions, explicit statements referring to how one will or can allocate personal resources, and statements referring to a division of labour, or roles, among participants in a shared activity.

5. Monitoring the solution (MC6): This metacomponent is represented by statements referring to the evaluation of a solution, including behaviors indicating evaluation. Also included are comments representing evaluation of a solution occurring in conjunction with a performance component, stating criteria for an evaluation, explicating the monitoring process without actual use of the process, showing awareness of the need to monitor, referring to one's own ability and performance not to a problem inherent in the task, and indicating completion of a task.

6. Using external feedback (E): Actual use of this seventh metacomponent in Sternberg's classification is difficult to measure, as one can identify when feedback is given and asked for, but the opportunity to use the feedback is likely to be unconnected with the initial response. However requests for external feedback will be tabulated with an "E" either alone, or in combination with the component associated with it.

## Performance Components

"Performance components are used in the execution of various strategies for task performance" (Sternberg, 1985, p. 105). These are actions taken by the individual, sometimes under the direction of the metacomponents, and can be divided into categories in terms of the type of response involved.

1. Encoding component (P1): This occurs when the child, in the course of reading or writing, makes sound-symbol associations. It includes orally sounding letters, spelling when reading or writing, reading or reciting the alphabet. The coding unit for this component consists of each partial response made by the child in attempting to identify the word (e.g. p-a-n= P1x3). As the other performance components are represented by phrase units, the P1 category may appear to have somewhat higher use in comparison to the other response categories than is actually the case.

2. Combining and Comparing Components (P2): This is the active consideration of how at least one source of information may be interpreted. The implication is that the child is exerting judgement in combining and/or comparing these sources of information. It includes: orally commenting on the appearance of print, using metalinguistic language to describe print, ie. the use of letter, word, sentence, space, reference to spelling; spelling a word to explain the reason for knowing (in conjunction with MC6); explicit use of background knowledge and/or context, including the interpretation of the mood of the story; and exploring alternatives in interpreting print.

3. Response Component: This component includes any final response in reading and writing, regardless of the cues that seem to have been used. This will be divided into four subcategories. In general, the coding unit for each of these responses consists of a meaningful phrase (e.g. She went [P3r] to the yard [P3r]. However, sometimes the child will begin to read a sentence, and then will sound out a word that is part of that phrase, or will echo read the remainder of the sentence with the teacher. In that case, a single word may be counted as a codable response. As a result the statistical relationships between the responses may be somewhat less than true, but as the partial responses can happen in each category, the discrepancy should be small. The criteria for each category follow.

Retrieval (P3r) - is a final response that occurs quickly after a question or stimulus. It need not be totally accurate, but must be contextually appropriate.

Echo (P3e) - is a final response that involves echo reading or repetition of an utterance made by the examiner or interventionist.

Hypothesis (P3h) - is a response involving an hypothesis or prediction, determined by the use of maybe, I think, or dealing with something in the future.

Undifferentiated (P3u) -is a general recognition and identification of print especially in Environmental Print tasks. This includes: identification of print by pointing, communication responses involving the use of contextual information (ie. description of picture content), references to the context within which reading occurs, and interpretation of symbols other than print.

Some responses are codable in more than one category. If they are part of the same phrase, they will be coded in a combination category (e.g. MC1MC2). The coding of the metacomponents and performance components follows the same categories and criteria as in the Emergent Literacy Study (Norman, Malicky, Leroy, Wu, & Malicky, 1992), with the exception of further subdivisions within certain categories. These operations are taken from the original with changes incorporated where appropriate.

When an "E" appears before the score, it means that the child has requested external feedback in conjunction with the use of the metacomponent. When a "P" occurs with the score, this indicates that there was immediate performance evidence that the child was actually using the strategy in the interactions.

## Data Analysis

The pretest-posttest results from the Diagnostic Survey (Clay, 1985), the Informal Reading Inventory (Burns and Roe, 1985) and the Test of Awareness of Language Segments (TALS) (Sawyer, 1987) were analyzed using a t-test for repeated measures. Because the sample group was somewhat small, the level for t-test results to be considered significant was set to $p = .01$.

The students' responses to the Emergent Literacy Tasks were coded using operational descriptors of metacognitive and performance components (Appendix A & B) from the Triarchic Model of Intelligence (Sternberg,1985). The responses for the pretests of students #1, 2, and 3 were coded independently by two raters, with consultation after each pretest. On the third pretest 92% agreement was reached. At that point, the remainder of the coding was done by the researcher. Metacomponent and performance component totals were obtained from each student's pretest and posttest responses (in addition to responses coded as having combined components). These results were then analyzed using a repeated measures t-test. Qualitative observations were also made, noting changes in the completeness and complexity of the metacognitive responses.

The next step was to analyze the audiotapes of the teacher interventions. For student #1, all audiotaped sessions were transcribed. Metacomponent and performance component responses were coded and totaled. It was determined that three sample lessons from the remainder of the students would be sufficient for the purposes of this study. The three lessons for each student were taken from the beginning, the middle and the end of the intervention. These were transcribed and the students' responses coded.

# 4. Results

In the first section of this chapter, I will document the results obtained by the Intense Early Intervention program. Results from several reading measures will be examined to determine the students' progress in the acquisition of reading. Confirmation of an increase in reading level will be followed by examination of the major and minor areas of the study; the changes in metacognition observed in the students during and after the intervention.

It should be noted that the effectiveness of the Intense Early Intervention program did not form a part of this study, nor did the study impose any but very minor changes on the intervention program. The points of contact with the students in the program were a pretest before the intervention process began, a posttest once the intervention was ended, and the taping by the intervention teacher of teacher selected lessons.

Changes in the reading levels of the students will be discussed. However, only when the reading results relate to the major and minor foci of the study will the reading intervention itself be examined. Otherwise, the reading intervention process is of secondary importance to this study.

Therefore, in the first section of this chapter I will answer the third question of the study: was the reading acquisition of the students during the intervention period of sufficient magnitude to provide a foundation for the primary focus of the study? This focus is the identification of metacognitive changes in the students during reading acquisition. As there is a great deal of relevant information, this preliminary section of the results will be quite extensive. I will discuss the increase in the students' ability to read including the following: improvement in the reading of continuous text, increases in scores on the Diagnostic Survey (Clay, 1985), improvement in the Test of Awareness of Language Segments (Sawyer,1987), changes in the performance component analysis of the Emergent Literacy Tasks (Norman, Malicky, Leroy, Wu & Juliebo, 1992), and results from the performance component analysis of the teacher interventions.

The Diagnostic Survey will be considered in two parts--those tests that are more specifically reading related, and those that are writing related.

Results from the Test of Awareness of Language Segments (Sawyer, 1987) will show changes in the students' proficiency in sentence and word segmentation. The coded responses from the Emergent Literacy Tasks, and from the teacher interventions will be used to note the changes in the performance components used by the students, from pretest to posttest, and during the teacher interventions. Examples of each type of performance component will be given, with discussion of any qualitative differences in the students' responses.

The second section of this chapter will answer the corollary question: can changes in the students' use of metacognitive components be documented over the course of the reading intervention? In this section, I will examine the coded responses compiled from the audiotapes of the intervention lessons. Results will be shown as a tally of the types of statements articulated by the students, reflecting the use of different metacognitive processes during the intervention lessons. There will also be an example of the interaction between a teacher and a student, showing how the teacher incorporates the implementation of strategies by the student into the lesson structure.

Finally, in the third and most important section, I will answer the main question in this study: is progress in the acquisition of reading accompanied by a change in the metacognitive processes of the students? The pretest-posttest changes in the students' metacognitive responses on the Emergent Literacy Tasks will be considered, both qualitatively and quantitatively. Examples of each of the metacomponents will be given, with qualitative differences between pretest and posttest responses identified. The responses will be examined to determine if there is a general increase in metacognitive expression, a general decrease, or a combination of increases and decreases, as was noted in the study of preschool children (Norman, Malicky, Leroy, Wu, and Juliebo (1992).

## Reading Acquisition of Students

### Reading Acquisition as Measured by the Informal Reading Inventory

The eleven students in the study made considerable progress in the acquisition of reading during the 12 to 16 week course of the intervention (see Table 1). The results of the Informal Reading Inventory (Burns & Roe, 1985) are not usually calculated if the word recognition is very low. However, for the purposes of this study I calculated the percentage of each student's correct responses out of the total number of words attempted. The change in word recognition on the PrePrimer passage was significant ($p = .0002$), when analyzed with a repeated measures t-test. In order to compensate for the small number of students, results were only considered significant for probability levels of .01 or less. As nine of the students did not complete the passage, the results on the pretest were likely an overestimate of their pretest reading level. The percentage of correct responses would probably have been lower if the students had been required to complete the passage.

On the pretest, before beginning the intervention, nine students were unable to complete the reading of an informal reading inventory at the preprimer level. Student #8 read the passage with 50% accuracy on word identification and student #5 completed the passage with 35% accuracy. The word accuracy for all students was too low to administer the comprehension questions. Considering that these children were all mid-grade one, three of them for the second year, they were truly unsuccessful readers of continuous text.

Following the intervention, five of the students read the preprimer passage successfully, with correct answers to all the comprehension questions, and 89-98% accuracy in reading the words in the passage. These students were able to read the primer passage as well. Their comprehension and word accuracy were less on the primer passage, from 50-75% and 83-91% respectively.

Table 1 Informal Reading Inventory Results

| Student | PrePrim-Pre Word Recog. | PrePrim-Post Word Recog. | PrePrim-Post Comp. | Primer-Post Word Recog | Primer-Post Comp. |
|---|---|---|---|---|---|
| #1 | 63%[a] | 94% | 100% | 87.5% | 50% |
| #2 | 75%[a] | 89% | 100% | 83% | 50% |
| #3 | 15%[a] | 50%[b] | | | |
| #4 | 40%[a] | 95% | 50% | | |
| #5 | 35% | 92% | 100% | 91% | 75% |
| #6 | 32%[a] | 75% | 75% | | |
| #7 | 50% [a] | 98% | 100% | 89% | 50% |
| #8 | 50% | 94% | 100% | 83% | 50% |
| #9 | 15%[a] | | | | 70% |
| #10 | 11%[a] | | | | 100% |
| #11 | 18%[a] | | | | 100% |
| t-test prob. | .0002* | | | | |

Note. Pre-Prim = PrePrimer. Pre = Pretest.
Passage Recog. = Recognition. Post = Posttest
Comp.= Comprehension.

[a] Passage is discontinued at frustration level for the student, usually at 70% or less word recognition.

[b] Predictable Book.

* Significance. To be considered significant probability levels were set at .01 or less.

Three other students had no preprimer posttesting, but read the primer passage from the Alberta Diagnostic Reading Program (Alberta Education, 1986). Results for them indicated comprehension levels of 70-100%. Their word accuracy was not recorded.

Two of the students were able to complete the preprimer passage with word accuracy rates of 75% and 95%, but with 75% and 50% comprehension respectively. This gain was respectable for a 16 week period, but these students did not meet the criteria enabling them to try the harder passage (suggested criteria for continuing are a word recognition rate above 90% combined with a comprehension rate above 50%. Burns and Roe, 1985). Student #3 was posttested with a predictable book, which he read with 50% accuracy. Although this result did not give an understandable measure of his reading level, it, too, represented gain for this reader. The informal reading inventory results conclusively showed an increase in reading acquisition over the period of the intervention program.

## Reading Acquisition as Measured by Diagnostic Survey-Reading Related Tests

Examination of the pretest, posttest results of the reading related tests (Letter Identification, Ready to Read Word Test, Concepts about Print) in the Diagnostic Survey (Clay, 1985) showed a general increase in the students' scores in all three tests (see Table 2). The reading results, as well as the remainder of the Diagnostic Survey results, were analyzed with a repeated measures t-test. As in the analysis of the informal reading inventory, in order to compensate for the small number of students, results were considered significant for probability levels of .01 or less.

There was a considerable spread in the scores (Range = 34-54) of the 11 students on the Letter Identification pretest, in which the students identify all upper and lower case letters plus two alternate forms of 'a' and 'g'. Two of the three students close to maximum on the Letter Identification pretest had scores that dropped slightly on the posttest. Four students had scores between 45 and 50, with the other four students between 34 and 40. By the end of the remediation, all students were within eight letters of mastery. Because some students began with high scores in this subtest, there was not as large a difference in the means from pretest to posttest ($M$ pre = 44.7, $M$ post = 50.9) as in the other predominantly reading tests, but the change was still large enough to show significance ($p$ = .007) on a repeated measures t-test.

Table 2 - Diagnostic Survey - Reading Related Tests

| Student | Letter Id. Pretest | Letter Id. Posttest | Sight Words Pretest | Sight Words Posttest | CAP Pretest | CAP Posttest |
|---|---|---|---|---|---|---|
| #1 | 54 (8) | 52 (5) | 9 (3) | 14 (5) | 17 (5) | 20 (7) |
| #2 | 53 (6) | 51 (5) | 5 (2) | 14 (5) | 19 (6) | 19 (6) |
| #3 | 37 (3) | 46 (4) | 2 (2) | 7 (3) | 14 (4) | 14 (4) |
| #4 | 46 (4) | 53 (6) | 5 (2) | 14 (5) | 16 (4) | 21 (7) |
| #5 | 51 (5) | 53 (6) | 3 (2) | 13 (5) | 16 (4) | 19 (6) |
| #6 | 46 (4) | 50 (5) | 2 (2) | 10 (4) | 14 (4) | 17 (5) |
| #7 | 48 (4) | 50 (5) | 3 (2) | 14 (5) | 17 (5) | 17 (5) |
| #8 | 49 (4) | 51 (5) | 3 (2) | 13 (5) | 15 (4) | 20 (7) |
| #9 | 34 (3) | 52 (5) | 1 (1) | 10 (4) | 12 (3) | 15 (4) |
| #10 | 40 (3) | 51 (5) | 1 (1) | 11 (4) | 17 (5) | 20 (7) |
| #11 | 34 (3) | 51 (5) | 2 (2) | 10 (4) | 15 (4) | 16 (4) |
| Mean | 44.7 (4.8) | 50.9 (5.1) | 3.3 (1.9) | 11.8 (4.5) | 15.6 (4.4) | 18 (5.6) |
| t-test prob. | .007* (.067) | | .0001* (.0001*) | | .0009* (.0026*) | |

Note. Stanine scores for tests are in parentheses () and are based on the 1978 standards in Clay, 1985.

Letter Id. = Letter Identification CAP = Concepts About Print

Sight Words = Ready to Read Word Test.

* Significance. To be considered significant probability levels were set at .01 or less.

The students, as a whole, began the intervention with few sight words, as measured by the Ready to Read Word Test (identified as Sight Words in Table 2, and in subsequent discussion). Student #1 read 9 of the 15 words, but the remaining ten students could identify less than six words. By the end of the remediation, all but one of the students were able to read between 10 and 14 words. Student #3 only identified 7 words. The mean number of words identified changed from 3.3 on the pretest to 11.8 on the posttest, a significant increase ($p = .0001$).

The third test assessing reading knowledge was the Concepts about Print test, in which I read the book Sand (Clay, 1972) to the student. During the reading, predetermined questions were asked to check on the child's understanding of the directionality of print, punctuation, print as containing the message, and numerous other print concepts. The test has a maximum score of 24. On the pretest, the students fell into the middle range, with raw scores from 12 to 19. Nine of the eleven students had stanines of 4 or 5, with student #9 lower and student #2 higher. All students either maintained or bettered their scores on the posttest, again a change that was significant on a repeated measures t-test ($p = .0009$).

## Reading Acquisition as Measured by Diagnostic Survey-Writing Related Tests

On the Writing Vocabulary subtest (see Table 3), the students were asked to write their name and all the words they knew in a ten minute period. On the pretest, the range of words known by the students was 3 to 24 with a mean of 10.7. The range at posttesting was 13 to 45, with a mean of 29.6 ($p = .0001$). With the increase in writing vocabulary, the mean stanine level of the group changed from an extremely low 1.4, to an average stanine level of 4. As on the sight word test, the change on the writing vocabulary test was substantial.

The Dictation test required the child to write one or two sentences, slowly dictated by the examiner. The test score was determined by counting the number of letter or letter combinations which appropriately represented the phonemes in each word. The test (maximum score = 37) measured the child's ability to analyze spoken language and represent it in print. Results on the Dictation test were slightly higher than on the writing vocabulary test, with a pretest stanine mean of 3.2, increasing to an average posttest stanine mean of 5.2.

Table 3 - Diagnostic Survey - Writing Related Tests

| Student | Writing Vocab. Pretest | Writing Vocab. Posttest | Dictation Test Pretest | Dictation Test Posttest | Language Level Pretest | Language Level Posttest | Message Quality Pretest | Message Quality Posttest | Direction Principles Pretest | Direction Principles Posttest |
|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 17 (2) | 45 (5) | 27 (4) | 32 (6) | 3 | 4 | 2 | 5 | 4 | 5 |
| #2 | 15 (2) | 31 (4) | 24 (4) | 33 (6) | 2 | 5 | 2 | 6 | 2 | 5 |
| #3 | 4 (1) | 13 (1) | 17 (3) | 10 (3) | 1 | 5 | 3 | 6 | 2 | 6 |
| #4 | 9 (1) | 29 (4) | 12 (3) | 37 (7) | 5 | 4 | 5 | 6 | 6 | 6 |
| #5 | 13 (1) | 44 (5) | 25 (4) | 36 (7) | 4 | 5 | 5 | 5 | 4 | 5 |
| #6 | 9 (1) | 19 (2) | 21 (4) | 33 (6) | 1 | 5 | 2 | 6 | 5 | 5 |
| #7 | 12 (1) | 37 (5) | 27 (4) | 34 (6) | 2 | 4 | 2 | 3 | 5 | 5 |
| #8 | 24 (3) | 32 (4) | 27 (4) | 34 (6) | 2 | 5 | 5 | 5 | 5 | 5 |
| #9 | 3 (1) | 32 (4) | 14 (3) | 28 (4) | 1 | 4 | 2 | 5 | 4 | 5 |
| #10 | 4 (1) | 23 (3) | 7 (2) | 29 (4) | 1 | 4 | 1 | 5 | 4 | 5 |
| #11 | 8 (1) | 21 (3) | 8 (2) | 27 (4) | 3 | 4 | 2 | 4 | 4 | 4 |
| Mean | 0.7 (1.4) | 29.6 (4) | 19 (3.2) | 30.2 (5.2) | 2.3 | 4.5 | 2.8 | 5.1 | 4.1 | 5.1 |
| t-test prob. | .0001* (.0001*) |  | .001* (.0003*) |  | .0004* |  | .0003* |  | .0165 |  |

Note. Stanine scores for tests are in parentheses () and are based on the 1978 standards in Clay, 1985.
Language Level, Message Quality, and Directional Principles are Measures of Writing Competance and are determined by averaging scores for each measure on three samples of the child's writing.

* Significance. To be considered significant probability levels were set at .01 or lower.

On the pretest writing samples, the students had reasonable control of the directional principles of writing, with a mean of 4.1 (maximum score is 6). The change to a mean of 5.1 approached the significance level. In the language level evaluation of the writing samples, the students were initially less successful. In language level evaluation, the form of the writing including the use of words, sentences, and paragraphs is analyzed. The students' results were also lower in message quality, which considers whether the students were copying print, using their own ideas, or generating a successful composition. The mean of the language level score on samples collected before the intervention was 2.3, the message quality mean score was 2.8. Following the intervention, performance on both of these measures rose significantly to a mean of 4.5 for language level, and a mean of 5.1 on message quality.

## Reading Acquisition Measured by Changes in Cognitive Strategies and Processes

The first part of this section examines changes in the students' ability to segment words, either for use in the identification of words while reading, or for use in the identification of sound elements that make up words for writing. The low pretest results on the subtests of the Diagnostic Survey (sight word recognition, writing vocabulary), and the low scores on two of the evaluation measures for the writing samples could reflect difficulty with segmenting or synthesizing the sounds of oral and written language.

In the Test of Awareness of Language Segments (TALS), (Sawyer, 1987), students represent elements of oral language with blocks. In TALS A, students were asked to represent each word in a sentence with a block; in TALS B, to represent each syllable of a word with a block; and in TALS C, to represent each phoneme of a word with a block.

The students began the intervention with a good knowledge of word boundaries (TALS A), with a pretest mean of 16.4 out of a possible 18 (see Table 4). Five of the students attained a perfect score. In fact, three of the students with scores of 16 and 17, missed the last responses because they just could not remember the sentence long enough to represent all the words with blocks. There were only three students who had any difficulty in this element of the test. Generally, their incorrect responses involved failing to separate an article from a noun, or joining the conjunction 'and' to the following word (e.g. Bill andMary). The posttest scores showed a slight loss in TALS A, from a mean of 16.4 to a mean of 16. Rather than an actual decrease in ability, this change likely reflects the fact that so many of the students were near the ceiling of the test. The students with lower results initially did make gains.

There was more variation in the students' ability to represent the syllables in words. Three of the students were successful on TALS C, and therefore automatically received scores of 10 on TALS B without being tested. Four of the remaining students scored nine or ten on TALS B (maximum score = 10), indicating a well developed ability to divide words into syllables. The four remaining students scored from four to eight on the pretest. The pretest mean on TALS B was 8.2. The posttest mean was 9.5, which was not a significant change. Again this can be accounted for by the number of student scores at or near the ceiling level of the test.

As expected, representing individual sounds in words with blocks was the hardest task for the students at the beginning of the intervention ($M = 3.4$). Seven of the students did not master the training tasks for part C of the TALS, and therefore received a score of zero on this segment. Student #2 successfully matched the phonemes for only three words. The remaining three students were successful on 10 to 12 out of the eighteen words. On the posttesting for TALS C, only student #3 was still unable to complete the training elements. Student #2 made very little gain in this section. The remaining nine students were correct on 11 to 15 of the test items. The posttest mean for TALS C was 11.6, up from a pretest mean of 3.4 and significant at .0005.

There was clearly a change over the course of the intervention in the students' ability to segment words into phonemes, therefore making the strategy of segmenting words to read or write them more available to the students. The results of this test, taken in isolation, do not measure the students' use of cognitive processes or strategies in reading. The results do demonstrate that students' ability to segment individual words into component sound units has increased.

Table 4 - Test of Awareness of Language Segments

| Student | TALS A Pretest | TALS A Posttest | TALS B Pretest | TALS B Posttest | TALS C Pretest | TALS C Posttest | TALS TI Pretest | TALS TI Posttest |
|---|---|---|---|---|---|---|---|---|
| #1 | 17 | 17 | 10[a] | 10[a] | 12 | 15 | 39 | 42 |
| #2 | 18 | 16 | 9 | 10 | 3 | 4 | 30 | 30 |
| #3 | 12 | 15 | 9 | 8 | 0 | 0 | 21 | 23 |
| #4 | 17 | 17 | 5 | 10[a] | 0 | 15 | 22 | 42 |
| #5 | 18 | 16 | 7 | 10[a] | 0 | 15 | 25 | 41 |
| #6 | 18 | 17 | 10[a] | 10[a] | 10 | 16 | 38 | 43 |
| #7 | 18 | 16 | 10[a] | 10[a] | 12 | 13 | 40 | 39 |
| #8 | 17 | 15 | 8 | 10[a] | 0 | 13 | 25 | 38 |
| #9 | 18 | 16 | 4 | 10[a] | 0 | 13 | 22 | 39 |
| #10 | 14 | 15 | 10 | 10[a] | 0 | 13 | 24 | 38 |
| #11 | 13 | 16 | 9 | 6 | 0 | 11 | 22 | 33 |
| Mean | 16.4 | 16 | 8.3 | 9.5 | 3.4 | 11.6 | 28 | 37.1 |
| t-test prob. | .276 | | .0842 | | .0005* | | .0012* | |

Note. [a] denotes this subtest not given because student was able to be tested on TALS C.

TALS TI=TALS total score.

* Significance. To be considered significant probability levels were set at .01 or less.

Although the subtest results of the TALS were of more importance to this study than the overall results, the overall test results also improved significantly as a result of the marked improvement in TALS C (*M* pre = 28; *M* post = 37.1; *p* = .001).

Is this improvement in the ability to segment words accompanied by a change in the strategies actually used by the students? This question will be examined in terms of the performance components elicited by the Emergent Literacy Tasks.

## Reading Acquisition as Measured by Performance Components of Emergent Literacy Tasks

The Emergent Literacy Tasks, given both pre and post intervention, were designed to provide a measure of the student's metacognitive and cognitive processes. This measure was obtained by having the students answer questions about reading while interacting with a picture; readability cards; objects, pictures, and logos with environmental print; a magazine spread; and a predictable book. The entire interview was audiotaped, and transcribed. The student responses were coded and tabulated. In each of the tasks, these eleven students were asked to identify what can be read, and were given the opportunity to read as much of the print as they were able to read, or as little of the print as they wished. There were no upper or lower limits on the number of responses given by each student. If the student did not respond to the question or probe, it was repeated or rephrased. If the student stated that he or she was unable to read anything, or if the student could not answer a question, that was accepted and the next item was introduced. Consequently, there was wide variation in the number of responses in the different categories. There was no optimum number of responses in any category.

The Performance components reflect some of the actual processes and strategies used by the children in reading or reading related activities. A brief description of each of the identified performance components is accompanied by examples of coded responses to the Emergent Literacy Tasks. Table 5 shows the compilation of responses tallied after coding the students' responses according to the operational reading definitions for Sternberg's performance components (for a full description see Appendix B). The responses in each category were analyzed using a repeated measures t-test. In order to compensate for the small number of students in this study, results were considered significant at $p = .01$ or less.

Encoding Component (P1): The encoding component occurs when the student, in the course of reading or writing, makes sound-symbol associations. An extreme example of ineffective use of this strategy was demonstrated by one student in the following exchange with the researcher.

Pretest

> After being asked to identify the print on a Crest toothpaste box the researcher asked: "what does it say on it?"
>
> Student #4: C-r-e-s-t, c-r-e-s-t, c-r-e-s-t, c-r-e-s-t, c-r-e-s-t, c-r-e-s-t, c-r-e-s-t. [P1-x35]
>
> Researcher: If you don't know, that's ok, you can just say I don't know.
>
> Student #4: I don't know.

On the pretest material, many other responses by this student used the same strategy, with the result that her total P1 count was 254. On the posttest, her total P1 count was 75. As identified by Lyons in her study of learning disabled readers (1987,1988), this student's only pretest strategy was sounding out words. Sounding out words remained a major strategy for her, but became more effective as can be seen in this example from the magazine task.

Posttest

> Student #4: I can read it? [EMC1] *E=Request for external feedback*
>
> Researcher: You can read it, yeah. *MC1=Defining the problem*
>
> Student #4: I [P3r], What am I? [P3r] by [P3r] S-t-e-p-h-a-n-i-e, S-t-e-p-h-a-n-i-e, S-t-e-p-h-a-n-i-e.... [P1 x27] *P3r=Retrieval response*
>
> Researcher: If you can't read part of it, just skip over it, and ..
>
> Student #4: In [P3r] d-a-m-p, d-a-m-p [P1 x8], damp [P3r] s-o-i-l, s-o-i-l [P1 x8] soil [P3r], I'm [P3r] f-o-u-n-d, f-o-u-n-d [P1 x10] found [P3r]. I [P3r] p-l-o-u-g-h, p-l-o-u-g-h [P1 x12] I play underground [P3r]. I old [P3r] , I [P3r] o-l-d [P1 x3]

Table 5. Performance Component Responses on Emergent Literacy Tasks

| Student | P1 Pre | P1 Post | P2 Pre | P2 Post | P3r Pre | P3r Post | P3e Pre | P3e Post | P3h Pre | P3h Post | P3u Pre | P3u Post |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 5 | 3 | 30 | 31 | 27 | 45 | 14 | 6 | 4 | 3 | 76 | 69 |
| #2 | 21 | 23 | 56 | 45 | 49 | 94 | 22 | 9 | 9 | 10 | 158 | 171 |
| #3 | 1 | 3 | 15 | 28 | 4 | 33 | 10 | 28 | 2 | 3 | 85 | 86 |
| #4 | 254 | 75 | 24 | 31 | 28 | 62 | 26 | 2 | 1 | 3 | 125 | 125 |
| #5 | 76 | 15 | 16 | 10 | 49 | 84 | 17 | 7 | 2 | 4 | 60 | 55 |
| #6 | 0 | 20 | 14 | 7 | 32 | 59 | 10 | 2 | 5 | 3 | 109 | 148 |
| #7 | 23 | 6 | 31 | 38 | 43 | 75 | 25 | 17 | 14 | 3 | 129 | 100 |
| #8 | 7 | 9 | 42 | 27 | 84 | 104 | 3 | 6 | 2 | 3 | 111 | 83 |
| #9 | 33 | 15 | 25 | 20 | 53 | 112 | 28 | 23 | 2 | 2 | 87 | 128 |
| #10 | 0 | 13 | 28 | 23 | 31 | 46 | 1 | 13 | 1 | 5 | 83 | 130 |
| #11 | 13 | 3 | 9 | 32 | 37 | 35 | 7 | 16 | 3 | 3 | 64 | 58 |
| Mean | 39.4 | 16.8 | 26.5 | 26.5 | 39.7 | 68.1 | 14.8 | 11.7 | 4.1 | 3.8 | 98.8 | 104.8 |
| t-test sig | .212 | | .959 | | .0002* | | .424 | | .821 | | .4668 | |

Note. P1. Encoding sound-symbol associations.

P2. Combining and comparing components.

P3r. Independent reading of print.

P3e. Echo reading or repetition of instructor's response.

P3h. Response involving hypothesis or prediction

P3u. General identification of print or picture context.

One student spontaneously attempted to use P1 responses to explain his response to the newspaper in Environmental Print Objects.

Pretest:

Researcher: Is there anything to read in that?
Student #5: Newspaper (pointing to SUN). [P3r]
Researcher: Ok.
Student #5: New-s-pa-per, new-s-paper, ne-ws-pa-per (pointing to SUN) [P1 x11]
Researcher: How did you know it said that?
Student #5: Cause, I read it. [MC1]

There were other students with no examples of P1 in their pretest interview, who had examples in their posttest interview. This one was from the Book Knowledge segment of the tasks.

Researcher: On the moor there was a
Student #6: dark, dark ... wood. [P3r]
Researcher: Ok, how did you know that?
Student #6: W-oo-d. [P1 x3]
Researcher: Umhm, how did you know the dark, dark?
Student #6: d-ar-k, d-ar-k. [P1 x6]
Researcher: Ok.

In this case, student #6 was using the sounds of the units in the words to determine and explain the correct match for the word. This student's use of P1 increased from 0 pretest to 20 posttest. This kind of explanation, using the sound units to explain either decoding or confirming the reading of a word, might be a possible explanation for some students having a decreased overt use of the P1 performance component. This strategy would still be used, but would become an automated and silent strategy as the students became more adept at its use. Certainly, in the case of this particular student, the only way I knew he was using the strategy to confirm the accuracy of his reading was because of the questions he was asked.

Combining and Comparing Components (P2): This component is the active consideration of how a source of information may be interpreted, including the use of metalinguistic language. For most of the students, this element did not change in terms of the number of occurrences. The pretest, posttest means were 26.4 and 26.5 respectively. There were changes in the quality of the occurrences, demonstrated by this student in his two responses to 'dog' on the Readability Cards section.

Pretest:

Researcher: Can somebody read that?
Student # 7: Yes.
Researcher: Ok, why?
Student # 7: Because it's spelled like dog. [MC1P2]

Posttest:

Researcher: How about that one?
Student # 7: We can read that.
Researcher: Ok, why?
Student #7: Because there's letters in it [MC1P2] and spells [P2] dog [P3r].

As the P2 component involves combining and comparing components, it is often used with one or more of the metacognitive components.

Response Component (P3u): For purposes of this study, the response component was subdivided into four smaller units. The simplest type of response to print was labeled P3u, and involved print recognition and identification. Also included was the use of contextual information such as picture and symbol description and interpretation. For most of the students, this category received the highest number of responses, both in the pretest and posttest interview (*M* pre = 98.8, *M* post = 104.8). The students' P3u responses varied considerably in their levels of complexity. The simplest responses were evoked by the Recognition of Reading picture, to which the students generally responded only by naming the objects or actions in the picture. There was little change from pretest to posttest.

Posttest:

> Researcher: Look at this picture and tell me what you see.
> Student #9: Ok. A train, a broom, a dinosaur, a book, a train track, girls, books, boys and blocks, and the teacher and a scissor and a paper and a chair and a table. And the shapes. [P3u x14]

None of the students gave a generalized response to the picture, either on the pretest or on the posttest (the picture is clearly a playschool or kindergarten type of setting), or questioned me as to the number, or type of responses I wanted. The same approach held true with the environmental print categories. The students were all very adept at identifying print on the objects, in the pictures, and on the decontextualized signs. For the most part they identified every bit of print on each item.

The next example shows a student using the contextual information to produce and explain a response.

Pretest:

> Student #10: Stop sign [P3u]... because it's a red sign and white words. [MC1P3u]
> Researcher: Ok. So, what does it actually say, it says....
> Student #10: Stop. [P3r] Stop sign for cars. [P3u]
> Researcher: Right. And how did you know it said that?
> Student #10: Because it's a red sign. [MC1P3u] I saw stop signs lots of times. [P2]

The Book Knowledge task provided two excellent examples of students using contextual information to enhance their understanding of the story. (The story in this predictable book takes place in a dark, spooky house, with the protagonists progressing through different parts of the house to find a mouse in bed in a box. A cat is a detail in all but the last three pictures of the story.)

Pretest:

Researcher: How do you think the mouse feels?
Student #1: Scared. [P3u]
Researcher: How do you know that?
Student #1: Cause his eyes are going (demonstrated wide eyed look) [MC1P3u]
Researcher: What do you think he's scared of?
Student #1: The dark. [P3u]
Researcher: How do you know that?
Student #1: Because he had to have a light beside him. [MC1P3u]

Posttest:

Researcher: How do you think the mouse feels?
Student #10: He's real scared. [P3u]
Researcher: How do you know that?
Student #10: Because there's a cat watching. [MC1P3u]
Researcher: Ok, and that's what he's scared of?
Student #10: Umhm, and he's scared of us too. [P3u]
Researcher: Is he, ok? How can you tell he's scared though? Is there some way you can tell?
Student #10: Cause of his eyes, kind of. [P3u] He's a cute little mouse. [P3u]

There was no appreciable change in the quality of P3u responses pretest to posttest in these students. Although there were some exceptions, the students did not automatically move from identification of contextual information to apply that knowledge to the interpretation of print. The majority of them did use the contextual information to help them identify print when asked to, and as can be seen from the last two examples, some of the students used the contextual information to develop rich interpretations of storybooks.

Response Component (P3e): The second type of response in this component involved echo reading, or repeating a word read by the researcher. There were few responses in this category, perhaps because the emphasis during the intervention was on having the student work out the word using whatever strategy was appropriate in the situation, assisting as little as possible. Overall there were more pretest responses (*M* pre = 14.8, *M* post = 11.7). Since this response is very straightforward, specific examples will not be given. However, a number of the examples given for other components will contain P3e examples.

Response Component (P3r): As might be expected after a number of weeks of intensive reading intervention, and in line with the growth shown in reading acquisition, the retrieval (P3r) category of response increased from a pretest mean of 39.7 to a posttest mean of 68.1. A response was deemed to belong in this category if the student responded reasonably quickly to the print with a response that was contextually appropriate, even if there was some inaccuracy. The following two examples demonstrate the change in one of the student's responses. In the second example, the retrieval response was accompanied by a request for external feedback.

Pretest:

Researcher: Try reading this page.

Student #8: At the for [P3r] um, a house [P3r], there was [P3r] a dark, dark mm mice [P3r]. (Correct text: At the front of the house there was a dark, dark door.)

Researcher: Ok.

Posttest:

Student #8: Up the stairs [P3r] there was [P3r] a dark dark [P3r] space [EP3r]? (question intonation only on last word)

*E= request for external feedback)*

Researcher: Good try, passage, which means it's like a hallway.

Student #8: passage [P3e].

Response Component (P3h): The fourth type of response in this component involved a hypothesis or prediction on the part of the student. This response occurred most frequently when the students were asked what the people in the initial interview picture were reading. There were few responses in this category and little change from pretest to posttest (*M* pre = 4.1, *M* post = 3.8). The students' responses to the picture of the bear on the cover of the teacher's book were 'about bears', 'Goldilocks and the Three Bears', and similar comments. Students' responses to the questions about what the children were reading varied widely, but the children based their hypotheses on information from the picture or from their own background.

Posttest:

> Researcher: So what do you think the boy might be reading?
>
> Student #10: Mm, maybe, Teenage Mutant Ninja Turtles [P3h], he's reading, I guess he's reading a Christmas book? [EP3h]
>
> Researcher: A Christmas book? or Teenage Mutant Ninja Turtles? Either one? (student nodded) Ok, that's fine. Why do you think he'd be reading about that?]
>
> Student #10: He might like about it, like the book. [MC1]
>
> Researcher: He might like it?
>
> Student #10: Umhm. Maybe it's a favorite. [MC1]
>
> Researcher: What about the girl? What do you think she might be reading?
>
> Student #10: This one here? Maybe she's reading, maybe she's reading The Witch and the Wardrobe. [P3h] I have the book of that!
>
> Researcher: Do you? Umhm. Why do you think she might be reading that?
>
> Student #10: She might like it too. [MC1]
>
> Researcher: It's a good story, isn't it?
>
> Student #10: Umhm. My mom just *loves* Witch and the Wardrobe. So mom bought a chapter book of it and then she bought me a little book of it.

With these students, there were only occasional instances of hypothesizing or predicting during the literacy tasks. This strategy may be underutilized by these students, even after they have had the benefit of the intervention.

## Reading Acquisition as Measured by the Performance Components during Teacher Interventions

At this point, the performance components that were identified during the teacher interventions are considered (see Appendix B for a detailed description). All tapes for student #1 were analyzed for metacognitive and performance components. From the pattern of responses on her intervention lessons, I determined that a beginning, middle and end intervention lesson would be representative of changes in metacognitive strategies and performance components throughout each student's intervention sessions. After completing the discussion of the performance components, the metacognitive strategies will be discussed.

The performance component categories are the same as in the last section. Table 6 contains a tally of the performance responses by the students in selected individual intervention lessons. There are three numbers in each space in the table (e.g. 0-0-0). The first number represents the first lesson audiotaped by the intervention teacher, usually the first or second lesson of the intervention. The second number represents approximately the median lesson of the intervention series, and the third number represents the last audiotaped lesson of the intervention.

The important change in this table is the increase from the first to second and third lesson of P3r responses. Although Table 6 shows that four of the students had fewer P3r responses in their last audiotaped lesson than in the middle lesson, that appeared to be an artifact of that particular lesson, rather than a decrease in reading control. Sometimes more time was taken to generate the sentence, rather than on reading familiar books. With student #6, the final lesson contained some concentrated time on two words to fluency with which the student was having difficulty. Because this response involved actual reading of words and phrases, the general increase indicated greater control by the student over the reading process. Again, variations in results in the other categories sometimes reflected the focus of that particular lesson. For example the initial Roaming Around the Known lesson for student #3 included reading a wordless picture book; therefore he had a high number of P3u responses to the contextual information in the pictures. In the first lesson, student # 4 was asked to talk about a variety of pictures; also creating a high number of P3u responses.

Table 6. Performance Component Responses during Teacher Interventions

| Student | P1 | P2 | P3r | P3e | P3h | P3u |
|---|---|---|---|---|---|---|
| #1 | 0 - 11 - 22 | 0 - 1 - 1 | 23 -92- 83 | 2 - 3 - 7 | 0 - 0 - 0 | 10 -15- 24 |
| #2 | 4 - 53 - 41 | 6 - 1 - 1 | 32-63-136 | 3 - 13 - 6 | 0 - 4 - 0 | 0 - 10 - 16 |
| #3 | 13 -17- 26 | 0 - 0 - 1 | 6 -106- 66 | 0 - 23 - 7 | 2 - 1 - 0 | 46 - 2 - 0 |
| #4 | 0 - 0 - 5 | 0 - 0 - 0 | 0 - 68 - 69 | 0 - 0 - 51 | 0 - 0 - 0 | 44 - 3 - 9 |
| #5 | 15 - 9 - 33 | 2 - 0 - 0 | 17-119-151 | 1 -0- 5 | 5 - 0 - 0 | 50 - 8 - 10 |
| #6 | 0 - 21 - 15 | 2 - 0 - 1 | 14 -81- 63 | 3 - 6 - 4 | 0 - 0 - 0 | 2 - 14 - 6 |
| #7 | 8 - 27 - 13 | 0 - 0 - 3 | 24-89-120 | 13 - 5 - 6 | 0 - 0 - 2 | 8 - 12 - 11 |
| #8 | 3 - 18 - 9 | 1 - 1 - 0 | 16 -90- 85 | 0 - 9 - 21 | 3 - 1 - 0 | 4 - 2 - 17 |
| #9 | 5 - 0 - 7 | 0 - 5 - 3 | 20 -79- 82 | 3 - 5 - 7 | 1 - 0 - 0 | 24 - 15 - 8 |
| #10 | 2 - 7 - 32 | 0 - 0 - 2 | 12 -60- 78 | 6 - 14 - 23 | 2 - 0 - 0 | 11 - 18 - 7 |
| #11 | 5 - 17 - 24 | 3 - 2 - 4 | 24 -89- 95 | 8 - 4 - 7 | 0 - 0 - 0 | 10 - 6 - 14 |

Note. The three numbers in each section represent the total responses for that performance component in the first, middle and end intervention lesson.

P1. Encoding sound-symbol associations.

P2. Combining and comparing components.

P3r. Independent reading of print.

P3e. Echo reading or repetition of instructors response.

P3h. Response involving hypothesis or prediction

P3u. General indentification of print or picture context.

The use of P3e, which involved echo reading with the teacher, or repetition of an unknown word after the teacher supplied it, varied from lesson to lesson. A lesson with a high number of responses in this category seemed to reflect a choice of reading material which the student read at less than a 95% accuracy rate. In that situation, maintaining the student's success was facilitated through unobtrusive assistance. A more appropriate book would be chosen for the next lesson.

In the three lessons for each student, there were very few responses codable as P3h. The student rarely made a prediction or hypothesis about the book he or she was reading. The lack of responses in this category during the teacher interventions reflected the lesson format, which was very much focused on the print in the student's books. The student was rarely asked to predict what was going to happen later in the book.

P2 responses (comparing and combining components) were low across the sessions. These infrequent responses may reflect an emphasis on engaging the student with the task of reading or writing, rather than talking about reading. There was a general, small increase in P1 responses, with the students becoming somewhat more active in the use of sound-symbol relationships to assist them in their reading.

## Summary of Reading Acquisition Results

The students as a whole improved in all the reading measures. This improvement was evidence of an increase in reading acquisition by the students in the study. In addition to the improvement on the informal reading inventory, the students had significantly higher scores in the subtests involving the recognition of sight words, written vocabulary, the dictation test and the written samples. They also had higher scores on the TALS C, demonstrating an increased ability to segment words, and had significantly higher response levels in the P3r category of the response components, both in the Emergent Literacy Tasks and in the last intervention lesson.

Examination of the individual results of the students supports the conclusion that each student in the study made progress in reading acquisition during the intense early intervention process. Therefore the main issues of the study can now be examined.

## Changes in Metacognitive Components During the Intervention

Can metacognitive performance be recognized and documented through the responses of the students during the intervention lessons. If it is determined that metacognitive components change as a student gains proficiency in reading, it may be important for a teacher to recognize metacognitive changes in the classroom, and to be able to influence those changes. To answer this question, the teachers audiotaped all the Roaming Around the Known section of the intervention (approximately two weeks for most students), and then taped an intervention lesson approximately once a week for the remainder of the intervention period. All the metacognitive statements in a beginning, middle, and end intervention lesson were identified and tallied (see Table 7).

In order for a metacomponent to be recognized and counted, it had to be articulated by the student. If the student paused before making a response, it was possible that he or she was using one or more of the metacomponents to determine his or her response. However, if that response was not accompanied by an observable verbal explanation, it could not be included in the count of metacognitive responses. The only exception was the monitoring metacomponent, observed when the student self-corrected. Clearly, many occurrences of metacognitive processing remained undocumented as a result.

The responses accompanied by metacognitive statements are concentrated in the MC1 category (defining a problem) and the MC6 category (monitoring the solution). Even in those categories there are few responses of a metacognitive nature during the interventions, considering the 35 to 40 minute time period of each lesson. Possible reasons for the lack of observable metacognitive processes will be fully discussed in the next chapter. However, because the students were not asked to explain the reason for their responses during the lessons, the metacognitive processes in the intervention lessons remained essentially indiscernible to the observer.

Table 7. Metacomponent Responses during Teacher Interventions

| Student | MC1 | MC2 | MC3 | MC4/5 | MC6 |
|---|---|---|---|---|---|
| #1 | 5 - 3 - 4 | 4 - 0 - 1 | 0 - 0 - 0 | 1 - 0 - 0 | 7 - 2 - 3 |
| #2 | 7 - 6 - 3 | 0 - 0 - 0 | 1 - 0 - 1 | 0 - 0 - 0 | 0 - 5 - 17 |
| #3 | 6.- 9 - 9 | 0 - 0 - 0 | 0 - 0 - 0 | 0 - 2 - 0 | 2 - 6 - 3 |
| #4 | 0 - 6 - 0 | 0 - 0 -0 | 0 - 0 - 0 | 0 - 0 - 0 | 0 - 3 - 2 |
| #5 | 5 - 1 - 8 | 0 - 0 - 1 | 0 - 0 - 1 | 0 - 1 - 2 | 11 - 5 - 4 |
| #6 | 0 - 3 - 5 | 2 - 0 - 2 | 0 - 0 - 0 | 0 - 1 - 0 | 2 - 3 - 7 |
| #7 | 2 - 3 - 6 | 0 - 2 - 1 | 0 - 1 - 0 | 0 - 0 - 1 | 4 - 2 - 6 |
| #8 | 7 - 4 - 3 | 0 - 0 - 0 | 0 - 0 - 0 | 1 - 0 - 0 | 0 - 5 - 4 |
| #9 | 6 - 4 - 5 | 0 - 0 - 0 | 0 - 0 - 0 | 0 - 1 - 1 | 4 - 6 - 8 |
| #10 | 3 - 1 - 4 | 0 - 0 - 0 | 0 - 0 - 0 | 1 - 0 - 0 | 7 - 9 - 6 |
| #11 | 2 - 0 - 3 | 0 - 1 - 0 | 0 - 0 - 0 | 0 - 0 - 1 | 4 - 6 - 5 |

Note. The three numbers in each section represents the number of responses for that metacomponent in the first, middle and end intervention lesson.

MC1 = Metacomponent 1: Defining the problem.
MC2 = Metacomponent 2: Generating steps to a solution.
MC3 = Metacomponent 3: Using alternate representations.
MC4/5 = Metacomponent 4/5: Deciding on an order for the other metacomponents/Planning for the allocation of attention.
MC6 = Metacomponent 6: Monitoring or evaluating the solution.

The infrequent responses in all the categories may be a reflection of the lesson structure, rather than a lack of metacognitive growth in the students. The lessons were highly structured on several different levels. Lessons emphasized the development of reading skills by the student through the successful performance of a number of structured reading activities, geared to the individual student's reading level. With the emphasis on the student's success, care was taken that the student was reading predictable material, either that he or she had just composed, or from books the student read with about a 95% accuracy rate. Problem words the student might encounter were often presented as fluency words prior to the reading. The student was certainly encouraged to pay attention to the print and look at the words carefully. Often the intervention teacher modeled the monitoring strategy, or directed the student's attention to the problem area. This teaching strategy did build the student's awareness of the need to monitor, in such a way that, in most cases, the student worked out for him or herself what the correct word was. In those cases, the student's response to an unknown, or incorrectly read word did not occur as an observable monitoring response.

An example of several of the teaching strategies used can be seen in the following teacher-student interaction during the reading of a predictable book. It was taken from the last intervention lesson for student #1. This reading follows preparation consisting of looking at the pictures, discussing the story line, and identifying the various animals and people in the story. The word bread which is the title of the book has been discussed, with the uncommon sound for ea pointed out by the teacher (see Appendix A for a detailed description of the metacomponents).

Teacher: Let's try reading it now, ok.

Student #1: Ok. Bread [P3r]. Mother said [P3r] *P3r=Retrieval*

Teacher: Now, let's look at this word.

Student #1: Mom [P3r]

Teacher: Yeah, it's that funny word.

Student #1: Mom said to the .. [P3r]

Teacher: Now here's a brand new word, and I want you to show me how you're going to figure this out and tell me while you're doing it. What are the ways that we figure out new words?

Student #1: Finding a little word in it. [MC2]

*MC2=Generating a solution*

Teacher: Do you see a little word in there? .... What's that word?

Student #1: in [P3r]

Teacher: in, now, do you think we'll know what this word is? What does t say?

Student #1: th [P1] *P1=Encoding sound symbol relationships*

Teacher: What does t say?

Student #1: tuh [P1] and wuh [P1] and in [P1] - t-w-in [P1], twins [P3r]
Teacher: What word, twins, that's a good one to figure out, and you saw the little word and that's perfect. The picture didn't tell us they were twins, does it?
Student #1: No.
Teacher: Not really, so we had to look for a little word. Good for you, ________. Let's read that sentence again, now.
Student #1: Mom said [P3r] to the twins [P3r], go and get the bread [P3r].
Teacher: Good.
Student #1: The twins got the bread [P3r].
Teacher: They sure did. They picked a nice loaf. Now, let's read.
Student #1: The ... [P3r]
Teacher: this is another new word, isn't it? Let's, let's leave this word. What's another way we can figure out a new word? Pictures, looking for little words, and what else can we do?
Student #1: Read past [MC2].
Teacher: Read past, ________, you know all the rules, good for you.
Student #1: ...umm
Teacher: Do we not know this word, I can't remember? Do you know that word?
Student #1: Umm
Teacher: Well, let's leave that word, too.
Teacher and Student #1: Hmm, hmm a [P3r]
Teacher: What did we say about this little dog, he would be kind of ....
Teacher and Student #1: hungry dog hmm hmm [P3e] They [P3e]
Student #1: saw [P3r] *P3e=echo reading or repetition of word*
Teacher: saw, good girl.
Teacher and Student #1: They saw a hungry dog [P3e].
Teacher: What did they say?
Student #1: Have [P3r]
Teacher: Have
Student #1: some bread [P3r].
Teacher and Student #1: they said [P3e]

Student #1: They saw some hungry ducks [P3r]. Have some bread [P3r]. They saw a hungry rooster [P3r]. Have some bread [P3r].
Teacher and Student #1: they said [P3e].
Student #1: They saw a hungry goat [P3r]. Have some bread [P3r], they said [P3r]. Mother said [P3r], Mom said [MC6P3r], what..[P3r]
Teacher and Student #1: where [P3e] *MC6=Monitoring*
Student #1: is the rest of the bread [P3r].
Teacher: How did you know the word rest? ... Try and tell me. Did the picture help you.
Student #1: a little
Teacher: More important though what else helped you? Was it the best word to fit in the sentence? Where is the hmm of the bread? You saw the r, where is the r-est of the bread. That's good _____, that means you're thinking about what you're reading.
Student #1: Dad said [P3r], there is the [P3r]
Teacher and Student #1: it is [P3e]
Teacher: now this is not quite there, just...
Student #1: here [P3r],
Teacher: here it is. Oh, good reading.

The underlined sections in the previous example show places where the student made an error in reading. In fact, the first example, 'mother' for 'mom', did not affect the meaning of the passage. A strategy of primary concern with early intervention students is the development of close attention to print. Therefore the teacher's response of 'Let's look at this word', probably while pointing to it, encouraged the student to reevaluate her initial response. In a later underlined response, the student actually did her own monitoring for the word mom. If the student had read the word correctly the second time, that would not necessarily indicate the use of a metacognitive process. The student may have simply recognized the word without having to make a decision about how to identify it. Therefore, a correct response does not automatically mean that metacognition is occurring. Metacognition only occurs if the active use of one or more of the metacognitive processes is involved.

In the second underlined response, the student responded incorrectly with 'th' for the sound of 't'. The teacher, probably aware that the student actually knew the correct sound, repeated the question, getting the correct response. In the next response, the teacher simply supplied the correct word when the student read 'what' for 'where', as she also did in the next example, 'is the' for 'it is'. Then, finally, the teacher again calls attention to the error, 'this is not quite there', and the child again supplied the correct word (here). None of these later occurrences represent use of the monitoring metacomponent on the part of the student. It would only be an observable monitoring response, if she had recognized the inconsistency herself, or self-corrected her errors without prompting.

Note as well, the teacher's effort to expand the student's metacognitive strategies for reading new words. This type of strategy use would fall under the metacognitive component of generating steps to a solution (MC2). There are five different strategies included in this lesson, two of which the student was able to identify--look for a little word and read past. The teacher verbalized three others for the student--using the picture, figuring out what will fit best in the sentence, and using the first letter to figure out the word.

Although, for the purposes of this study, it would be useful for the teachers to ask the students questions about the reasons for their responses, this type of question would actually distract the student from the meaning of the story they were reading, and would be counterproductive for reading acquisition. The expectation for the study was that the students would make more spontaneous metacognitive statements than they did.

This partial lesson was not necessarily representative of the program received by all eleven students. Each student began with different effective, ineffective, and absent strategies, necessitating a focus on what that particular student needed. There were commonalities in the instruction given to all students, with an emphasis on developing a variety of strategies and knowledge in the students. Examination of Table 8 later in this chapter will show there was a change in the use of some of the metacomponents from the Emergent Literacy Tasks from pretest to posttest, which cannot be explained adequately by the slight changes noted during the interventions.

## Change in Metacognitive Strategies during Reading Acquisition

It is now time to examine student responses for the main focus of this study: to determine the presence of metacognitive knowledge and the pattern of changes in the metacognitive knowledge of the students as reading acquisition occurs. This important, but relatively unexplored aspect of reading acquisition, is examined through analysis of the student responses on the Emergent Literacy Tasks. As has been mentioned several times throughout this chapter, observable evidence of metacognitive processing is difficult to obtain. The Emergent Literacy tasks, with the frequent questioning of the student after a response to determine the reason for a particular response, were designed to make the metacognitive processes apparent. This measurement is impacted to an extent by the students' ability to articulate the process they have used.

In many cases, it was difficult to isolate a specific metacomponent. A particular metacomponent often occurred in combination with another metacomponent or in conjunction with a performance component. Even through one response on the part of the student sometimes contained two different metacognitive processes, in the interests of determining the extent to which each process was used, both were counted. Again, a brief description of each metacomponent will be given, with examples (see Appendix A for a more complete description of each metacomponent). The changes in the metacognitive responses were analyzed with a repeated measures t-test. None of the changes on the metacognitive responses were at statistically significant levels, but the monitoring metacomponent (MC6) had changes that were meaningful and approached significance. Table 8 shows the compilation of the students' coded responses.

Table 8. Metacomponent Responses on Emergent Literacy Tasks

| Student | MC1 Pre | MC1 Post | MC2 Pre | MC2 Post | MC3 Pre | MC3 Post | MC4/5 Pre | MC4/5 Post | MC6 Pre | MC6 Post |
|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 74 | 49 | 4 | 1 | 1 | 0 | 2 | 0 | 18 | 9 |
| #2 | 46 | 73 | 12 | 13 | 2 | 1 | 6 | 8 | 13 | 72 |
| #3 | 58 | 58 | 4 | 13 | 0 | 0 | 1 | 1 | 41 | 87 |
| #4 | 38 | 30 | 13 | 19 | 0 | 0 | 2 | 2 | 14 | 20 |
| #5 | 61 | 58 | 1 | 8 | 0 | 0 | 1 | 2 | 17 | 23 |
| #6 | 60 | 67 | 8 | 12 | 0 | 0 | 1 | 5 | 16 | 32 |
| #7 | 65 | 63 | 15 | 15 | 1 | 0 | 7 | 5 | 29 | 26 |
| #8 | 93 | 69 | 14 | 14 | 0 | 0 | 4 | 2 | 24 | 26 |
| #9 | 57 | 58 | 8 | 7 | 0 | 0 | 5 | 4 | 9 | 19 |
| #10 | 64 | 72 | 12 | 6 | 0 | 0 | 7 | 3 | 11 | 23 |
| #11 | 66 | 52 | 6 | 9 | 0 | 0 | 4 | 3 | 19 | 17 |
| Mean | 62 | 59 | 8.8 | 10.6 | .27 | .09 | 3.6 | 3.1 | 19.2 | 32.2 |
| t-test sig | .5192 | | .209 | | .1669 | | .5102 | | .0671 | |

Note: MC1 = Metacomponent 1: Defining the problem.

MC2 = Metacomponent 2: Generating steps to a solution.

MC3 = Metacomponent 3: Using alternate representations.

MC4/5 = Metacomponent 4/5: Deciding on an order for the other metacomponents/Planning for the allocation of attention.

MC6 = Metacomponent 6: Monitoring or evaluating the solution.

* Significance. To be considered significant probability levels were set at .01 or less.

## Defining the Problem (MC1)

This metacomponent includes references to reading and writing as being purposeful, references to one's ability to read, and references to problems with specific reading tasks. This was the most frequently observed metacomponent, both on the pretest and the posttest Emergent Literacy Tasks. MC1 was also, by a large margin the most frequently used metacomponent in the preschool study in all age groups (Norman, Malicky, Leroy, Wu & Juliebo, 1992). When considered objectively, it seems natural that in emergent readers, this metacomponent would occur most often. Students have difficulty evaluating solutions, or generating steps to a solution, if they have not identified a problem to be solved. The students in this study had little overall change in the number of occurrences pretest to posttest (*M* pre = 62, *M* post = 59), but there was an increase in the number of occurrences of MC1 in combination in the posttest (*M* pre = 24.8, *M* post = 26.5). MC1 most often occurs with MC2 or MC6 (note the following examples). As a student becomes a more proficient reader, it makes sense that recognition of a problem would be accompanied by steps to a solution, or correcting the problem. This combination is reflected in one of the examples below when student #2 says she (the little girl) wants to learn how to read. The problem is wanting to read, the solution is to learn how to read. The two metacomponents become very tightly interwoven as the student develops metacognitive facility. The students' ability to articulate this metacomponent improved during the intervention process. The Reading Interview provides some good examples of students' use of this metacomponent.

Pretest

> Researcher: Look at me. Can I read like this (eyes are closed)?
> Student #10: No.
> Researcher: Why not?
> Student #10: Because your eyes closed and you can't see the words when your eyes are closed [MC1P2].
> Researcher: Ok. Can I read with my mouth closed?
> Student #10: Umhm. Yeah, you can read in your mind [MC1MC2]. While you're looking at the pictures [MC4/5].

*MC2=Generating steps to a solution*
*MC4/5=Ordering and planning*

Posttest

Researcher: Look at me. Can I read like this (eyes are closed)?

Student #10: Umm, no, with your eyes closed, you can't [MC1]. But if you mesmorized a piece of paper in your own words, you could read it [MC1MC2].

Researcher: Ok, so the reason that I couldn't read with my eyes closed is...what?

Student #10: When you're looking at the paper and you close your eyes, you can't really see [MC1].

Researcher: Can I read with my mouth closed?

Student #10: Yeah. Besides you could read inside your head [MC1MC2].

This student's response to the question about reading with eyes closed was technically more accurate on the pretest. However, her answer to the second question was an indication that she was incorporating additional information about the function of memorization into her understanding of the reading process. Her first answer to the question about reading silently seemed to indicate that the presence of pictures would be a necessary component for reading silently. Her answer on the posttest clearly indicated reading as a mental activity.

### Generating Steps to a Solution (MC2)

This metacomponent includes the things one can do to read or write, including restricting content, and identifying what one does to read or to learn to read. The MC2 component often occurs in conjunction with another metacomponent, especially MC1, as recognizing the problem is often a necessary part of generating a solution. Some excellent examples of MC2 occurred in the Reading Interview.

Pretest

Researcher: (asking about the girl who is reading in the picture) What is she doing when she's reading?

Student #7: She's um, she's thinking in her mind [MC2], and she's saying it in her mind, or she can say it in her voice [MC4/5].

Researcher: Ok. How do you know that?

Student #7: Well, because she can read quietly and you can read loud [MC1MC2].

Researcher: You can yes, but how did you figure that out?

Student #7: Cause my brothers do that.

Researcher: Do you read the same way as your dad reads?

Student #2: Sometimes when (he's) tired (on a) page (he) says look at the first word [P2] in front and say pretend it's a h and go and you go eh, eh, eh a and he tells me the next word [MC4/5], then you keep on going like aaa eh eh aa [MC2]

Researcher: Ok.

Student #2: I went like that.

Researcher: So is that how you read?

Student #2: Yeh, if I don't know the word [MC1P2], we just say the sounds [MC2].

On his pretest response, student #2 had some knowledge of how he went about solving the problem for words he didn't know. From his description, it was not clear if he ever expected to arrive at a word he recognized, or whether just saying the sounds of the words was the reading. In general, the posttest responses of the students indicate a clear expectation of reading recognizable words, and list specific strategies for figuring words out. Student #2's response to what the little girl in the picture does to read is an indication of using a specific strategy to assist with reading.

Posttest

Researcher: What about the girl? What do you think she's reading?
Student #2: Little Miss Muffet [P3h].
Researcher: Ok, I wonder why she'd be reading that, do you think?
Student #2: She wants to learn how to read [MC1MC2].
Researcher: Ok, what does she do when she's reading?
Student #2: She looks at the pictures to get clues [MC2P2].

Researcher: What do you think your friend does when he's reading?
Student #5: He use his fingers [MC2], and sounding out the words [MC4/5].
Researcher: So you think he does that?
Student #5: All of us do [MC1].

Researcher: How do you think you're going to learn to read better?
Student #4: By practicing [MC2].

Researcher: Do you ever help them? (a classmate who is reading to her in the reading corner)
Student #7: Yeah, when they get stuck on a word [MC1P2].
Researcher: And so how do you help?
Student #7: I sound out the word [MC2P2].

Researcher: What does she (the girl in the picture) do when she's reading?
Student #9: She thinks [MC2], ... if it's hard that is [MC6].

Student #9 understands that some reading requires more effort than other reading. There was no indication of this kind of distinction on the pretest responses of any of the students.

Researcher: Would you like to know how to read better?
Student #11: Yeah. That's why I learn from my mom [MC2]. And then I try to tell them the same like her [MC2 MC4/5].

Researcher: Can you read anything that it says there (Environmental Print Task - picture of a Petro-Canada station)?
Student #7: Yeah. Car [P3r]. Van [P3r] (pointing to Car and Van Wash), and that's all [MC6].
Researcher: Car and Van, ok, and how did you know it said that?
Student #7: Because, I didn't sound them out [MC2 MC6].
Researcher: You didn't, then how?
Student #7: Cause they're small words [MC1 P2].
Researcher: Cause they're small words? Ok, so how does that help if they're small words?
Student #7: Because they're easier to sound out [MC2].
Researcher: Ok. But you didn't sound them out, did you?
Student #7: Umum (No.)
Researcher: So do you know how you figured them out.
Student #7: No, because they're in books [MC1 P2].

Student #7 provides a clear example of someone who is aware of different metacognitive strategies for determining steps to a solution, but who has difficulty articulating that knowledge. She has sight word recognition of these small words, but doesn't have a term to explain it, so her explanation involves the elimination of the strategies she is not using. She has a developing control of the process, which is the most important aspect of metacognition.

One of the criteria for this metacomponent is that of delimiting the task. In this study I noted very few instances of that particular use of MC2. The students sometimes said 'and that's all', but the context helped to identify that group of responses as MC6, either indicating completion of the task, or referring to their ability to read the remainder of the print. As noted in the performance components when the students would identify all the visible print in the environmental print tasks, the students did not seem to recognize or consider limitation of the task, or attending to one aspect of the task as a possibility.

## Using Alternative Representations (MC3)

This metacomponent involves exploring and comparing alternate representations of information across reading and writing to examine goals and strategies. The MC3 metacomponent was seldom used by the children in this study. Some of the few examples follow.

Pretest

Student #1: (after finishing with *A Dark, Dark Tale*) My friend has that book.

Researcher: Does she?

Student #1: Umhmm, it's sort of the same as our book in our class [MC3]. In a dark, dark closet, in a dark dark cupboard there was a dark dark box and in the box there was a ghooost.

Researcher: Find a word on this page (from the magazine task).

Student #7: Yep. (pointing to I in What am I?) [P2]

Researcher: How do you know that's a word?

Student #7: Because you can remember it from this eye (pointing to her own eye). [MC3]

Posttest

Researcher: (asking about the 7 Eleven Logo from the Environmental Print tasks) Do you know what it says, is there anything to read there?

Student #2: 7 - 11 [P3r]

Researcher: Ok.

Student #2: (whispering) But it haves a 7 [M1M6] one, two, three, four, five, six, seven, eight, nine, ten, eleven (counting various elements in the sign to reach a total of 11) [MC3]. 7 - 11 [P3r], I can tell that, cause those are that that, that that that (showing how he counted them to reach eleven) and that's eleven [MC6].

Researcher: Ok. Ok, good.

Student #2: And there's 11 pictures.

These students did not articulate any elaborate strategies for remembering the shapes of letters of the alphabet, or for figuring out words by relating them to other known objects. These few examples show that this strategy is not beyond their ability to use, although when one of the teachers does try to develop the use of this strategy in the intervention lessons, the student does not seem able to pick up on the strategy use.

### Determining Order for other Metacomponents/Planning the Allocation of Attention (MC4/5)

This metacomponent includes the organization of strategies and actions, the allocation of personal attention and resources, and the division of roles between participants in an activity. It is a metacomponent that one would expect to play an increasingly important role in reading acquisition, as the student reaches higher levels of competence. This metacomponent occurred in each student's responses, but there was not a high incidence of use. There was no overall group change from pretest to posttest (*M* pre = 3.6, *M* post = 3.2), although some individual students used this metacognitive strategy more frequently following the intervention, and it was more often used in combination in the posttest. Emergent readers may need encouragement to use this metacomponent, or a different type of task may be required to elicit examples from the students. A number of examples follow from a variety of sections in the Emergent Literacy Tasks. Note the difference in the overall quality of the responses given by the students in the pretest interview, and following the intervention in the posttest interview.

Pretest

Researcher: What happens to someone if they grow up and they don't know how to read?

Student #3: They have to go to our school and read [MC4/5].

> Researcher: What happens to someone if they grow up and they don't know how to read?
> Student #6: Then if the other person's good [MC1] then they could just tell them the words [M4/M5].

These two students do have a vague understanding of how to combine activities to learn to read, but their understanding remains undifferentiated in these two examples. Student responses include general activities they recognize as ways to learn to read, but the students do not identify a strategy the adult could use in his or her reading. The student in the next example also had the idea that there are different steps to reading, but either her solution, or her ability to articulate the steps remains ineffective. Of major importance is that she is developing the ability to think metacognitively.

> Researcher: What does he (the boy in the picture) do when he's reading?
> Student #8: Umm, looks at the, looks at the pages [MC2] and looks at the picture and then he tries to sound the picture out so he can read it [MC4/5].

> Researcher: What's good about reading?
> Subject #9: People like to read [MC1].
> Researcher: Can you tell me why?
> Subject #9: Cause they want to think in their head about ABC [MC2P2], they want to think about..., like if they forget the stories, like if your mom takes the story back to the store, and you've never finished the ending and you're on the tenth chapter with one more and that's it. She takes it back and just the end and you think about it in your head, put the story in your head and turn the pages in your head, then you think about the stories [MC4/5].

Student #9 has a lovely explanation for the value of reading, but also for extending reading experiences mentally.

Researcher: And what does she (the girl in the picture in the Reading Interview) do when she's reading?
Student #10: She reads the words that are on the page [MC2P2], and she looks at the pictures, too [MC4/5].

Posttest

Researcher: What do your friends do when they are reading?
Subject #10: They read, sometimes they look at the pictures [MC1MC2], sometimes they need hints, they look at the pictures [MC4/5].
Researcher: Umhm. So they get their hints from the pictures, do they?
Student #10: Umhm.

Researcher: (Asking if someone can read a phrase containing an upside down word from the Readability Cards). How about that one?
Student #7: Kinda, kinda not [MC6], because ones upside and ones the other ways up [MC1].
Researcher: Ok, now kind of...
Student #7: You can turn it this way, like that, that spells likes [P2], (turning card back) milk and Sam [MC4/5].
Researcher: Uh, so can you read it, do you think?
Student: #7: Umhm.

Researcher: (sign in environmental pictures) Is there anything there you can read?
Student #7: You did not [P3r] -You [P3r] (pointing to you) did [P3r] (pointing to do) not [P3r] (pointing to not).
Researcher: Ok. And how did you know those?
Student #7: Just because I see them every day in books [MC2], and I read them and I remember the ... the name of it [MC4/5].

Researcher: Do you know what anything says there (the stop sign in Environmental Pictures Task)?
Student #4: Yep.
Researcher: What?
Student #4: Stop [P3r].
Researcher: Ok, how did you know that?
Student #4: Because I looked at the word [MC2 P2], and I saw top [P3r] in part of it, and I sounded it out [MC2 MC4/5].
Researcher: Ok.
Student #4: And looked if it was the right word [MC6].

In the posttest examples for this metacognitive component, the students articulate clearly the steps they use in reading. In the last example, student #4 is able to explain the use of three strategies to read and confirm the accuracy of her reading. The rest of the explanations are not as elaborate, but the students use language with words such as hints, clues, name of the word, spells to identify the processes used.

## Evaluation of a Solution (MC6)

This metacomponent includes statements about evaluating a solution, and behaviors indicating that evaluation of a solution is occurring. It also includes references the student makes to his or her own ability. Since measurement of a behavior is included, this metacomponent is more easily identified when used by the student in the process of self-correction. There was a considerable increase in the use of this metacomponent following the intervention (*M* pre = 19.2, *M* post = 32.9). The increase in this metacomponent approached significance. As can be seen in the examples, the students seemed to have more control over this metacognitive strategy following the intervention.

Pretest

Researcher: (from the Magazine Task) Do you know what that says down here? You can guess if you want.

Student #8: (pointing to What am I?) What am I [P3r]?

Researcher: Ok.

Student #8: (pointing to by) m-y [P1 x2], my [P3r] my [P3r] - mm [P1], (pointing to Stephanie) I don't know what that word is [MC6P2] I only know this word - What am I [MC6P3r]?

Student #8 may actually have been monitoring her response when she repeated 'my' several times for 'by'. As students sometimes repeat a word they know for a try at the next word they don't know, this repetition was not clear enough to code as a monitoring response. The MC6 coded responses clearly differentiate between her inability to read particular words in the task, and her ability to read other words.

Researcher: Would you like to know how to read better?

Student #3: I already know how to read better [MC6].

Researcher: Can someone read this? (AZ from a Readability card)

Student #3: Yes, No. No [MC6].

Researcher: You can't read that? Why can't you read it?

Student #3: Cause there's no words in it [MC1 P2]. Those don't look like words [MC6 P2].

Student #2: (reading from Environmental Logos Task - sign in shopping center re use of shopping carts) And there is that thing again (referring to sign which he saw previously in Environmental Pictures Task) 25¢ to up [P3r], no to up 25¢ [MC6 P3r] (changing the order to right to left reading)

Researcher: (monitoring question from book knowledge task. Correct text - In the cupboard was a dark, dark corner.) Now listen and tell me if I'm right or wrong. 'The cow jumped over the moon.'

Student #1: Noo!
Researcher: How do you know?
Student #1: Because I know the word cow [MC1 P2] and it isn't there [MC6].

Researcher: Tell me about that picture. (Environmental Print Task - picture of a 7 - 11 store)
Student #11: Red Rooster [P3r]. I mean, Seven - Eleven [MC6 P3r]. Cause that's a 7 (pointing to 7) [MC1 MC6].
Researcher: So, that's how you knew it said that.

Researcher: In the passage was a dark dark curtain. (Correct text - Across the passage was a dark, dark curtain.) Is that right or wrong?
Student #5: (pointing to Across) This is wrong [MC6].
Researcher: That one's wrong, ok, what told you that one was wrong?
Student #5: Cause In [MC6 P3r].
Researcher: Because ..?
Student #5: You said in
Researcher: I said In and this doesn't say in?
Student #5: Umum (no).
Researcher: How do you know it doesn't say in?
Student #5: Cause it doesn't i-n [MC1 P2].

Researcher: Can I read like this (with eyes closed)?
Student #6: No.
Researcher: Why not?
Student #6: Because you can't see the words [MC1 P2] and you could make some mistakes [MC6].

In the previous examples the monitoring responses are pretty well self-explanatory. The students seemed to have a fairly well developed ability to articulate this metacognitive process even on the pretest.

Posttest

Researcher: So, do you think you're going to learn how to read better anyway, even if you don't want to?

Student #3: No.

Researcher: No.

Student #3: I don't think so [MC6].

Researcher: You don't think so? You don't think anybody's going to teach you to read better?

Student #3: I have to go on to Stage 2, today [MC1].

Researcher: What's that?

Student #3: Ok, you go on to anoth.. I was on Stage 1, then I got on to Stage 2, then Stage 3, then Stage 4, then Stage 5, and then Stage 6 until I get all better [MC2 MC4/5].

Researcher: So is Stage 2, that's a reading level, is it?

Student #3: Yeah.

Researcher: Ok, so it sounds to me...

Student #3: It's kinda hard [MC1]. They're kind of hard books [MC6].

Researcher: Are they. It sounds to me like you are going to be reading better. If you're going to stage 2, that's harder than stage one, right?

Student #3: Umhm.

Researcher: So I guess, I guess you are, would they move you there if you couldn't read there.

Student #3: No. You can go on to any levels you want [MC1].

Student #3's response to the question about learning to read better has undergone a complete change from his earlier response of already knowing how to read better. Although on the intervention tapes he tackled the reading with confidence and enthusiasm, in this posttest interview, his confidence in his reading in a different situation (he was going to read with the intervention teacher in a group of four) was shaky. He was able to articulate fairly well what he expects the problems to be; the immense number of stages stretching before him, and the reading level of the books.

His evaluation of his own reading ability was much closer to reality following the intervention.

> Researcher: How about that one? (Petro-Canada Logo from Environmental Print Logos)
> Student #6: Maple leaf [P3u] and the words [P3u].
> Researcher: Ok, can you read the words?
> Student #6: Yes, I can read them [MC1] - Canada flag [P3r].
> Researcher: Ohh, ok. Does it say Canada flag there?
> Student #6: No, I just made it say that [MC2 MC6].
>
> Researcher: Can you read anything there (Environmental Print Logos Task)?
> Student #10: It says Exscalator [P3r]. (Pointing to Transit Zone) That's supposed to say Bus stop [MC6 P2]. Yeah it's supposed to say bus stop.
> Researcher: It 's supposed to say bus stop? Ok. How did you know that?
> Student #10: Because it has a bus stop place, a bus stop sign [MC1].
>
> Researcher: Can I read with my mouth closed?
> Student #9: No.
> Researcher: No? Ok. Why not?
> Student #9: Cause if you don't read with your mouth open then you don't know any words [MC1 P2]. ... But you can think in your head [MC2 MC6].
> Researcher: You can think in your head? Umm, so then could I read with my mouth closed, if I thought in my head?
> Student #9: (nodded).

Here was a case where student #9 reevaluated his original response and revised it when he thought of a more appropriate response.

Researcher: (Magazine Task) Can you show me a word on this page?
Student #8: Umhm.
Researcher: Ok, which? Can you show me? I'm not sure what you're pointing to exactly. (pointed to What am I?) [P2] Ok, but just one word.
Student #8: This one (pointing to What) [P2].
Researcher: Ok, and how do you know that's a word?
Student #8: Cause it has like letters in it [MC1 P2]. Not the letters that just going together spell nothing [MC6 P2].

This student has developed the knowledge that not all combinations of letters will result in an actual word. The explanation is still awkward, but the reasoning is accurate.

Student #7: (Environmental Print - Picture of a stop sign) Stop [P3r]. Stop, that spells stop [P2] (pointing to Stop on stop sign).
Researcher: Umhm.
Student #7: And I know that says stop [MC1 P3r] and that's 4 [P3r] (pointing to 4), but I don't know what this is [MC6] (pointing to way on 4 way sign under the stop sign).

Researcher: Do you read the same way as your dad does?
Student #2: Umm, not the same way [MC1MC6], he reads a book that I'm supposed to read and it won't sound the same to me [MC6P2]. Right, I read it first, then I listen to him read it, then it won't sound the same [MC4/5]. It will sound different a little [MC6].
Researcher: Do you know why?
Student #2: Because he has not the same voice [MC1]. But I just talk normal when I'm reading, he kinda doesn't [MC1MC6].

The students' use of the metacognitive component (MC6), both from the perspective of increase in frequency of use, and from the perspective of difference in the quality of the responses, seems to have developed the most over the course of the intervention. This metacomponent changed from a pretest mean of 19.2 to a posttest mean of 32.2. The change approached significance (*p* = .07).

## Using External Feedback (E)

Changes in this metacomponent cannot be identified through the type of investigation that was done for this study. To identify use of this metacomponent, it would be necessary to find out what the student knew, set up a situation where feedback was given to the student, and then determine if the student's knowledge base had changed following the feedback. This would only measure feedback the student had used successfully and would not identify the student's unsuccessful attempts to use the feedback. Therefore, the results are not included in Table 8. However, for this study, the attempts on the part of the student to get feedback from the examiner by asking questions was documented. Questions that involved metacomponents and performance components were combined. Questions that were unrelated to the reading task were tallied but not included in the analysis. The pretest mean for requested feedback was 2.9, the posttest mean was 3.7 (*p* = .213). The range for feedback requests was 0 - 10 on the pretest, and 0 - 15 on the posttest. There were three students on the pretest who asked no questions, and 4 on the posttest. Student #2 and student #3 asked the most questions, with 10 each on the pretest, and 15 and 8 respectively on the posttest. As it was apparent early in the pretesting of the first student that seeking information from an adult might be an underutilized strategy, I took great care to answer any questions that were asked.

## Summary of Changes in Metacognitive Strategies

Examination of the changes in the metacognitive responses of these students during the intervention period, while reading acquisition was in progress, resulted in some expected and unexpected results. A definite increase in the quality of the responses has occurred, with an increase in the frequency of use of two of the metacomponents. A discussion of these results and the results analyzed earlier in the chapter is next.

# 5. Discussion

The major focus of this study was to determine if the acquisition of reading in emergent readers was accompanied by changes in metacognition. A pattern of metacognitive changes was found, but before these changes can be discussed, the progress in reading acquisition made by the study students had to be confirmed. Therefore, the initial section of this discussion will highlight the changes in various reading measures obtained by the students.

A secondary focus of the study was to document the growth of metacognition as it occurred during the intervention lessons. The second section will discuss these findings, as well as the change in the performance responses. At that point, with the necessary foundation established, changes in the metacognitive responses of the students on the Emergent Literacy Tasks will be explored.

The limitations of the study will be briefly documented. Then the perceptions and conclusions that have been arrived at through the course of this study will be discussed. These will include suggestions both for intervention teachers and for classroom teachers. Finally, suggestions for future research will be given.

## Changes in Reading Acquisition

In this study, the students began the intervention program in late January or early February, after a pretesting process. Each student had 14 to 16 weeks of daily intervention, with an intervention lesson audiotaped at approximately weekly intervals. Immediately following the intervention process, posttests were given to the students.

This study included students selected to participate in the Intense Early Intervention program who, because of the excellent results known to be obtained by the program, would be expected to have significant changes in their reading acquisition within a short space of time (Clay, 1985; Lyons, Pinnell, DeFord, Place, & White, 1990; Wheeler, 1984). The virtual assurance of reading change made this an excellent group for an exploratory look at the changes in metacognition during the acquisition of reading. This group may not be representative of the emergent reading population as a whole. The study nevertheless provides excellent information for planning further investigations into the metacognition of emergent readers.

As shown by their reading scores before the intervention (Table 1), students in this study had very little success with the reading of continuous text during their exposure to formal schooling (a half year for eight students, or a year and a half for three students). The students then went on to make meaningful gains over the course of the 16 week intervention period, reading successfully at least at the PrePrimer level.

As can be seen by examining the stanine scores of the Letter Identification, the Sight Word Test, and the Concepts of Print test in the results section (Table 2), the overriding weakness of the students in knowledge relating to reading was in the ability to recognize and identify words. The stanine mean for the group on the Sight Word pretest was 1.9, as compared to a mean of 4.8 for Letter Identification and a mean of 4.4 for the Concepts About Print test. Students made the greatest gains in terms of stanine scores in the Sight Word Test with a posttest stanine mean of 4.5.

In the tests that have a focus on writing (Table 3), students also made significant gains. The gains on the Writing Vocabulary subtest were substantial with a posttest mean of 10.7 words and a stanine mean of 4, a change from an extremely low pretest stanine mean of 1.7. Results on the Dictation Test were marginally better, both on pretest and posttest measures (*M* pre = 3.2, *M* post = 5.2, stanine scores). As this test measured elements in words rather than the complete word, it made sense that the students would be more successful than on the writing vocabulary subtest, which required correctly spelled, complete words.

Analysis of writing samples for the students, again, indicated an unevenness in the student's abilities. The students were initially less successful in language level, and message quality with reasonable ability in the directional principles of writing.

With these results, based on the evidence of the Informal Reading Inventory (Burns & Roe, 1985) and the Diagnostic Survey (Clay, 1985), clearly the students have made considerable progress in the acquisition of reading. The increase in codable responses in the retrieval response category of the performance components [P3r] on the Emergent Literacy Tasks, an actual measure of reading responses, provides further evidence of a substantial increase in reading acquisition by all students.

In this study, the participating students were not paired with a control group, therefore it cannot be definitively stated that the intervention program was responsible for the progress the students made in reading. Nor, is it the intent of this study to make that determination. However, considering the studies of the seminal Reading Recovery programs, and the excellent scores on the posttest reading measures, it is likely that the Intense Early Intervention program, around which this study was structured, was a considerable factor in increasing the rate of reading acquisition by these students.

In addition to test measures of the increase in the level of the students' reading acquisition, as the intervention lessons progressed the taped lessons conveyed a sense of increasing reading acquisition. The students read with increasing confidence, and identified more words without assistance. In many cases, comments during the lessons indicated the students were working on their reading at home, and were keeping a count of the number of books they could read correctly. The students also made enthusiastic statements about reading the books from the intervention to their classes. Student #3 went from an initial strong resistance to the many reading components of the program, to an enthusiasm about reading and confidence in his reading ability. In the middle intervention lesson, he proudly counted the number of books in his box (12), and told the intervention teacher about reading them to his class. Although on test measures, his gains in reading were the least of the whole study group, his change in attitude towards reading was profound.

Another aspect of the reading success of the students was the cognitive changes that occurred with the acquisition of reading. Consideration of the changes from the pretest to the posttest Emergent Literacy Tasks (Norman, Malicky, Leroy, Wu &Juliebo, 1992) and Test of Awareness of Language Segments TALS (Sawyer, 1987) reveals specific changes. The TALS results (Table 4) clearly show that phonemic segmentation has become a more available cognitive strategy for the students. Encoding the sound-symbol relationships (P1) was more in evidence on the pretest Emergent Literacy Tasks, than on the posttest tasks. This result seems to be at odds with the increased availability of phonemic segmentation, especially since encoding sound-symbol relationships was used with some frequency during the lessons that were audiotaped. There are several possible reasons for the discrepancy. One reason for the lower number of P1 responses could be that because of the increase in the number of words the students recognized at sight, reliance on the encoding of sound-symbol relationships is less. A second reason could be that the students are using a wider variety of cuing systems, again making them less reliant on the sound-symbol cuing system, a possibility that would relate to Lyons' studies of learning disabled students in Reading Recovery programs (1987, 1988, 1991). A third reason may be that as students use the encoding of sound-symbols more effectively, it, too becomes an internal strategy, less perceptible in its use. At this still early stage of reading acquisition, probably the encoding of sound-symbol relationships is still frequently used, especially with regard to the first letter component of words. Likely, encoding sound-symbol relationships has become an internal strategy, and is used more successfully in combination with the other cuing systems, therefore being less apparent. There was little change from pretest to posttest in the performance response category, involving recognition of print and use of contextual information (P3u). These students seemed to have a well developed ability to identify and implement this form of information at the beginning of the intervention.

There was little change in the cognitive strategy of combining and comparing components (P2). The use of this strategy was moderate during the pretest and posttest measures, but the strategy was used overtly very infrequently during the audiotaped interventions. There were a number of cases when the teachers guided the students through the use of this strategy, but with little evident result on the posttest.

The major change in cognitive processes was in the use of the retrieval response (P3r). This response increased at significant levels from pretest to posttest on the Emergent Literacy Tasks. As this change was also strongly reflected during the intervention lessons, it seems clear that the students developed considerable lexical knowledge along with strategies increasing the effective and efficient retrieval of information from their word lexicon.

Two strategies that appeared to be of minor importance during this study were echo reading, or the repetition of a word supplied by another reader, and predicting or hypothesizing about upcoming text possibilities. Both types of response were low in frequency, both on pretest and on posttest measures. As prediction is considered an important element of effective reading, the low levels are of some concern. Is this a strategy that develops later on in the reading process for all students, or does it require continuing efforts on the part of the classroom teachers to develop it? At what point does prediction and hypothesizing come into the reading process for most readers? This study did not attempt to identify all cognitive strategies used by readers, but keyed in on some important strategies.

### Metacognitive Changes During Intervention

A auxiliary, but important focus of the study was to determine if metacognitive change could be identified and measured during the teacher interventions. Student responses from the audiotaped intervention lessons were transcribed and coded using the operational definitions of Sternberg's Triarchic Theory (Appendix A & B) to provide an identical measure of the underlying metacognitive and performance changes used with the Emergent Literacy Tasks. The number of responses occurring over the course of the interventions did not appear to be an accurate reflection of the actual change in cognition and metacognition that seemed to be taking place. Although a number of student responses for each metacognitive and performance category were able to be identified, there was little evidence of an increase in metacognitive responses. Nor, with the exception of the increase in responses in the retrieval category of the performance components, did the profile of responses seem to reflect what was actually being learned in the lessons. In light of this unexpected result, a review of the measurement tools, in combination with a review of the structure of the intervention lessons was done, providing a possible explanation for the difficulty of identifying the changes.

The intervention lessons were structured to move the child as efficiently as possible to a better understanding of written language, by giving the student numerous concentrated experiences with print and with the analysis of print. Many teacher instances of modeling the use of reading strategies, and guiding the student through the use of a number of different strategies were noted. However, the instructional focus was on the implementation by the student of the reading strategies, encouraging the growth of the strategies through frequent opportunities to put them into practice, and gradual withdrawal by the teacher from initiating the strategy. Although an increase in efficient strategy use is a clear goal of the Reading Recovery/Intensive Early Intervention program (Clay, 1985), the actual steps given for the intervention process focus mostly on the actual tasks and steps to be included, with effective strategy use remaining an implicit factor. The result, then, is that the instructional focus was not on the kind of reflective discussion that might have resulted in the students verbalizing their metacognitive understandings. Students were often praised for looking carefully at words, or for identifying a word or sentence correctly after a pause, or even for making a close approximation to the correct text. But, as the child was rarely asked why they made a choice, there was usually no window into the metacognitive strategies they were using.

Initially, this result came as a surprise, as Lyons' (1987, 1988, 1991) studies of LD students in Reading Recovery programs identified changes in strategy patterns, and Opitz (1991) suggests the teaching of the awareness of strategies that are used in reading as a reason for the success of Reading Recovery programs. I expected to find verbal evidence, in terms of metacognitive statements on the part of the students, to show that the students were incorporating metacognitive strategies into their reading repertoire. However, considering the recency of the interest in metacognition, and the number of procedures that have been designed to study metacognition, it is evident that metacognition itself is an internal mental process, and that growth in metacognition is also likely to be an internal mental process (Downing, 1969). A teaching program, even though designed to produce more effective cognitive and metacognitive processes in reading, is not designed to elicit overt metacognitive statements. Nor is it designed to elicit an accurate overt production of the cognitive strategies the students use to produce their final response. In fact, providing a window into the metacognitive processes of the students was the original reason for designing the Emergent Literacy Tasks (Norman, Malicky, Leroy, Wu and Juliebo,1992).

The intense early intervention lessons may be responsible for some increase in metacognitive functioning in the students in the study. However, the low number of metacognitive responses during the intervention lessons suggests that the way the metacognitive strategies were fostered cannot be identified by this study. The qualitative change in response from pretest to posttest on the Emergent Literacy Tasks provides evidence that there is change in the metacognitive functioning, but how the change is brought about will have to be determined in another study.

## Changes in Metacognition

The major focus of this study was to examine the changes in metacognition that occur during the acquisition of reading. In fact, there were no changes in the response frequency of the metacognitive components that reached significance in this study. There was an increase approaching significance in the MC6 (monitoring) response, and a small increase in the MC2 (generating steps to a solution) response. However, examination of the quality of the responses in each metacomponent demonstrated an increasing complexity in the responses for each metacomponent, and a greater clarity in the metacomponent responses.

The patterns of use from student to student were reasonably consistent in all the metacomponents that were examined in this study. The metacomponent for identifying the problem (MC1) was used the most frequently both pretest and posttest, consistent with the pattern of use by preschoolers in the study of Norman, Malicky, Leroy, Wu and Juliebo (1992). In their study, the comparative frequency of this metacomponent dropped with each age level in the study. The relative frequency of use in the six year old group was considerably lower (50%), than in the study students on the pretest measure (66%). The posttest result for the students in the study, at 55%, was closer to the preschool six year old result. As was seen in the examples (p. 81), the identification of the problem statements became more elaborate following the intervention.

These students' increased reading levels were accompanied by an increase in frequency of the monitoring and evaluating metacomponent (MC6). There was a meaningful change in this metacomponent from pretest to posttest, at a level approaching significance. As in the preschool study, this metacomponent fell second in frequency of use, occurring about half as often as the MC1 metacomponent on the posttest. Again there was a shift in the quality of the responses, with the posttest responses being clearer and more complex in nature (p. 90 - 93). The posttest increase brought the level (30%) just higher than the six year old preschool results (27.2%).

The MC2 metacomponent, generating steps to a solution, at 9.4% occurred much less frequently than the MC1 metacomponent. This metacomponent did increase moderately from pretest to posttest (9.8%), remaining very close to the six year old preschool response level of 9.5%. This important metacomponent does not yet play a large role in the student's observable metacognitive responses. Because this metacomponent (MC2) can only be measured in terms of the students' statements (in contrast to MC6, the monitoring metacomponent, which also includes self-correction behaviors), this measurement may be an underestimate of the amount of change that occurred in the use of this metacomponent over the course of the intervention. Use of this strategy did receive considerable emphasis during the intervention lessons. The students' responses for this metacomponent were of a higher quality on the posttest.

There was little change in, and minimal use of two of the metacomponents identified for this study. There was sporadic use of alternate representations (MC3), but in essence it was virtually absent both on this study and on the preschool study. Not enough information was gathered by this study to understand if this metacomponent is important in the early acquisition of reading, nor is it clear if it is important in fluent reading.

Another metacomponent (MC4/5) was deciding on an order for use of the other metacomponents and planning for the allocation of attention. There were a few instances of this metacomponent. The frequency of use of the MC4/5 metacomponent was considerably lower, on both the pretest (3.4%) and posttest (2.9%), than in the preschool study at the six year old level (12.8%). In fact, it was lower than in the four and five year old groups, as well (6.6% & 5.1% respectively). There are several possible reasons for the discrepancy. As writing tasks were included in the preschool study, possibly those tasks generate a higher number of MC4/5 responses, making comparison of the two studies inappropriate. A second possibility is that the students in this study have not developed effective use of this metacognitive strategy, and that development of this strategy is resistant to instruction in these particular students. A third possibility is that the students begin with low levels of this metacognitive strategy, but that it does not receive an instructional focus during the intervention and therefore, improvement in use of this strategy does not occur.

Overall comparison with the study done with preschool children by Norman, Malicky, Leroy, Wu and Juliebo (1992) reveals that all but one of the metacognitive responses are within a 5% range of those found for the six year olds in the preschool study. The exception is the MC4/5 metacomponent, which accounted for 2.9% of the metacognitive utterances posttest, compared to 12.8% in six year olds in the preschool study. Pretest levels of the responses showed greater variance from the preschool results with higher levels of MC1, and lower levels of MC6 in the students in this study. MC4/5 was lower both before and after the intervention with the remaining metacomponents on both studies at very low, but stable levels. Both the preschool study and this study were preliminary and exploratory in nature, so before definite conclusions can be reached about the metacognitive patterns, further information needs to be collected.

In comparisons of the pretest-posttest metacognitive utterances of the students, posttest responses were of higher quality and more complexity, with statements more likely to contain more than one metacomponent on the posttest measure. Numerous examples of this greater complexity were apparent in the examples in the results chapter. The students were more likely to include pointing to the words (p. 83), and the use of pictures as a source of information when explaining what they do when they read (p. 83). Student #8 (p. 90) explained that two letters (AZ) can't be a word because those letters aren't used to make a word, a concept not mentioned in any pretest responses. Student #4, when explaining how she knew the word stop, gave three different strategies for confirming the word (p. 89). Student #6's explanation of why you can't read with your eyes closed, included making mistakes with not being able to see the words, making the answer more complete than on pretest responses by any student. These examples are all indicators that metacognitive changes occurred in the students.

One particular concern noted during both the pretesting and posttesting was the lack of questions from the student. In an hour of fairly relaxed interaction between myself and the children, there were very few questions. Student #2, in the posttest interview, had 15 questions asking for feedback relating to the reading tasks, but several of the children asked no questions, either about reading, or about anything else. The materials were interesting to the children, and they willingly tried to do the things they were asked to do. But for a six to seven year old child who is presented for a whole hour with material that contains print, to ask so few questions, suggests that he or she has a passive approach to learning. This type of behavior is in sharp contrast to that discussed by Durkin (1966) and Clark (1976). They both identified a curiosity about print as a characteristic of the child who learns to read early. It would be interesting to know if this apparent lack of curiosity is a general characteristic of these children, or is specific to the reading area. It would also be interesting to know if this passivity is a behavior that was learned by these children, or if they innately lack curiosity. Perhaps they are curious but need to be taught how to access the information that other people have.

## Limitations of the Study

This study does provide a great deal of information about this group of emergent readers. However, it would be useful to have data on the metacognitive responses of other types of readers generated with similar instruments. These studies should include readers at the same age level as well as older readers. Conclusions that are reached about the patterns of metacognitive responses of the students in the study rely on comparisons with a study of preschool children. While the comparison is useful, it leaves many questions unanswered about metacognitive development during reading acquisition. As a result, conclusions that are put forth must be confirmed by further research before they can be given full credence.

Since this study did not include a control group, it cannot be ascertained definitely that the metacognitive changes were the result of the increased reading acquisition. There is a possibility that the changes resulted from the intervention itself, and do not normally accompany an increase in reading acquisition. However, it definitely can be stated that in this group an increase in reading acquisition was accompanied by an increase in metacognitive responses, especially for the monitoring and evaluation response.

A further limitation of the study is that the measure of metacognitive functioning, the measurement of responses to the Emergent Literacy Tasks, are merely an external measure of a primarily internal process. This means that any metacognitive process that was not accompanied by an articulated metacognitive response, was not measurable. Therefore, the actual metacognitive measurements are certainly lower than the actual number of metacognitive events. While this is an expected shortcoming, it is also possible that the Emergent Literacy Tasks measure one type of metacomponent better than another resulting in skewed values.

## Conclusions of the Researcher

Intense Early Intervention/Reading Recovery programs are truly marvelous. The teachers in the program are able to facilitate the development of the cognitive and metacognitive strategies necessary for reading, at the same time helping their students to develop considerable knowledge about specific aspects of reading. As well, the teachers develop students' confidence in their ability to learn to read, all in the 16 week intervention period. The teachers show great persistence in repeatedly taking the students through the strategies for identification of unknown words. This must be a characteristic developed by the teacher training program for the Reading Recovery/Intense Early Intervention programs, as it is difficult for teachers to identify the amount of persistence that is optimum to keep a child on task and whether that persistence will result in success. The design of the program, so that the student is working with storybooks that he or she can enjoy, and read independently at about a 95% level, is a crucial element of the program.

There seem to be at least two subgroups of students in reading intervention programs. All students come to school having had some exposure to print in preschool experiences. It may be that for one group of students, these experiences have involved little more than casual observation of print. They do not seem to have the drive some children have to determine the meaningfulness of the print, and may get little encouragement to interact with the print from the people in their environment. Or the children may have obvious or inapparent language difficulties that result in difficulty in accessing knowledge about print. According to Menyuk et al. (1991), it may be possible to identify children who are at risk for problems with reading acquisition. Children with overt language problems are definitely at risk, certain other children who have apparently overcome language problems, and those with low birth weight children may also be at risk for reading failure. These students likely come into school with some knowledge of print and reading, but not enough that school instruction can fill in the gaps and make reading an accessible process for them. Students #3, 6, 9, 10 and 11 may fit into one of these categories with low overall profiles on the Diagnostic Survey pretest.

Another group of students seems to be those who are curious about print, interact with it, and see it as relevant, but who have inappropriate metacognitive strategies for using their knowledge to obtain meaning from the print. Lyons (1987, 1988, 1991) found that learning disabled children who begin their intervention focused almost exclusively on the sound-symbol relationship, make better progress than the other students eligible for Reading Recovery. The key is helping the students switch to multiple cuing systems for word identification. Students #1, 2, 4, 5, 7 and 8 may fit into that group. Student #4 in particular was very highly focused on the sound-symbol relationship. These students had a number of scores in the higher range on the Diagnostic Survey, but were particularly low on the Ready to Read Word list and on the Writing Vocabulary sections of that test, possibly indicating a difficulty in integrating the information they have into meaningful knowledge. It appears that both groups lack effective and efficient metacognitive strategies.

The students in this study appear to have a pattern of metacognitive use that is not efficient for reading. They are frequently able to begin to identify the problem, but have not made a sufficient shift to the follow-up strategies of generating steps to a solution, and monitoring the solution. In contrast to the preschool six year olds, the students underuse the metacomponents of allocation of attention and determining the order for using the other metacomponents. In common with the preschool children, they do not use the comparison of alternative representations to assist with their reading. The Intense Early Intervention Program appears to be effective in developing more flexibility in the use of the metacomponents, and provides the kind of practice that increases the availability of the cognitive strategy of segmenting words. The program appears to increase the children's ability to retrieve stored information, and increases the amount of stored information in terms of easily recognized words in the student's lexicon.

Examination of the intervention lessons revealed that many of these strategies, and the related knowledge to implement the strategies, are not easily assimilated or implemented by the students. The strategies are repeated and practiced in a variety of formats in a very intensive manner, often over a number of lessons, before the student truly has ownership of the strategy. This need for repetition and reinforcement may account for the fact that the main growth was in the area of monitoring, which was the most heavily emphasized strategy in the intervention lessons, with lesser growth in generating steps to a solution and no appreciable growth in the other metacognitive strategies. The difficult acquisition of these important aspects of reading has implications for both intensive early intervention programs, elementary classrooms, perhaps for preschool intervention, and for parent education programs.

## Educational Implications

The effectiveness of the Intense Early Intervention program, with the unique combination of ingredients that make it successful, has information for the classroom teacher. Reading about the program and its components does not give a true understanding of how the program interacts with the individual student. Nor does the available information convey the level of intensity and persistence that is necessary to help the student in the program become a successful reader. Every classroom teacher should have the opportunity to observe a teacher-student combination through a complete intervention, to participate in the training program, and ideally to have the opportunity do some intervention work. Integration of some of the teaching structures, the analytical student observation, and learning philosophies of the intervention program into classroom instruction may avert the need for intervention for some of the students.

This study and the ongoing need for Intensive Early Intervention programs are evidence that there is a need for all students to have some systematic involvement with print before they come to school. This involvement could occur in preschool, kindergarten or home settings. There is the need for the development of some educational programs to assist the adults involved to focus on ways to successfully help the children (Mason, 1984). Home literacy programs can play an important role in this educational process (Nuckolls, 1991).

Further study of the metacognitive processes of other emergent readers may help to identify certain aspects of metacognition that require more emphasis in the Intense Early Intervention program. Perhaps certain metacognitive functions in the individual student requiring a greater focus can be identified. More research into emergent metacognition is necessary to determine usual metacognitive patterns first.

## Suggestions for future research

There has been much recent interest in the part phonological segmentation plays in learning to read, with the result that this ability is recognized, at the very least, as being correlated with reading ability. Much less attention has been paid to the role of metacognition in reading acquisition. Results from this study suggests that there is a change in the metacognitive components related to reading with an increase in reading acquisition. This study provides evidence that there is an identified pattern of use of the metacognitive components in emergent readers.

An important step, to be able to determine the actual importance of metacognitive implementation with emergent readers, is to do widespread studies of the changes in metacognition as a variety of children learn to read. This would include those whose primary avenue of learning appears to be through formal school instruction, those who appear to learn to read prior to formal instruction, and continuing study of those who learn to read through intensive instruction programs.

The pretest - posttest format with the Emergent Literacy Tasks used with the operational definitions of Sternberg's Triarchic Theory seems to be an appropriate measure for use in these studies. The questions and tasks seem directed enough, but also open-ended enough to generate a wide variety of responses in emergent readers. It might be more appropriate to extend the book knowledge task as the student gains proficiency in reading. Then, in addition to the structured monitoring task, the student can be given a text to read that is expected to present a level of difficulty for them in their reading. This might provide more insight into the use of the metacomponents and performance components, especially if the reading is videotaped and a session is immediately done to obtain verbal reports from the student as to the strategies that were used.

A more revealing format may be one in which an intervention lesson or a portion of an intervention lesson is videotaped and shown to the student. The student can then be asked to say what he or she was thinking when making selected responses. This type of study would impact more on the intervention program, but may actually serve to consolidate the metacognitive processes for the student and provide the opportunity to validate or extend the student's thinking. Certainly, a more accurate documentation of changes in metacognitive and cognitive strategies over the course of the intervention should emerge. A study with this design may have the added value of being able to determine teacher interventions that were most effective in producing metacognitive and cognitive growth in the students.

Another parallel or related investigation would involve the videotaping of certain lessons, either individual or classroom lessons, then asking the student or students for verbal reports of some of the silent monitoring or decision-making processes. In combination with the measures used by the observer for those strategies that have an auditory component, a more accurate measure of actual metacognitive involvement during the reading process could be determined. This reflective process on the part of the students may be valuable for increasing the knowledge of metacognitive functioning, but also for identifying and remediating insufficient or inappropriate strategy use.

It would be useful to compare results obtained from studies of emergent readers with studies done with fluent readers, to see how the balance of metacognitive functioning in fluent readers compares with that of emergent readers.

In summary, this study of students in an intensive early intervention program opens a very small window into the metacognitive processes as they occur in a specific segment of the emergent literacy population. The study provides important information about the metacognitive processes during reading acquisition.

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# Appendix A

## OPERATIONAL DEFINITIONS OF METACOGNITIVE COMPONENTS

The scoring of the metacomponents and performance components followed the same categories and criteria as in the Emergent Literacy Study with the exception of further subdivisions within certain categories. This document is taken from the original with changes incorporated where appropriate.

### Metacomponents

"*Metacomponents* are higher-order executive processes used in planning, monitoring, and decision making in task performance" (Sternberg, 1985, p. 99). According to Forrest-Pressley and Waller (1984) "metacognition is a construct that refers, first, to what a person knows about his or her cognitions and second, to the ability to control these cognitions" (1984, p. 6). To indicate a metacomponent, a statement must be explicit and must indicate *awareness* and /or *control over reading or writing processes*. Metacomponents are marked MC.

### Defining the Problem (MC1)

Responses related to defining the problem include:

- references to reading and writing (and learning how to do so) as purposeful.
- evaluative statements implying a purpose for reading
- general references to one's ability
- reference to problems with respect to specific tasks
- reference to reading and writing as having specific criteria or demands, related to knowledge of what reading and writing are
- recognizing the need to know how to read

Generating steps to a solution (MC2)

The types of things one can do to read or write including:

- restricting the content as well as delimiting the task (ie. deciding to focus on one aspect of it)
- references to what one does to read and write, or to learn how to do so
- references to learning and teaching reading or writing.
- references to practice as a way of learning how to read

Using alternate representations (MC3)

Statements involved in exploring and comparing alternate representations of information across reading and writing, with evidence that it is being done to examine goals and strategies.

Deciding on an order for the other metacomponents/Planning for the allocation of attention (MC4/5)

Statements referring to sequencing in time of the types of steps mentioned in MC2 or MC3 and statements referring to the allocation of one's attention.

- organization of one's strategies and actions
- explicit statements referring to how one will or can allocate personal resources
- statements referring to a division of labour, or roles, among participants in a shared activity

MC6 Monitoring the solution

Included is any statement referring to evaluation of a solution. It also includes behaviors indicating evaluation.

- evaluating a solution. This occurs in conjunction with a performance component.
- stating criteria for an evaluation
- the child explicates the monitoring process without actual use of the process. Has awareness of the need to monitor.
- child refers to their own ability and performance not to a problem inherent in the task
- child indicates completion of a task

### Using external feedback (E)

Actual use of this seventh metacomponent in Sternberg's classification is difficult to measure as one can identify when feedback is given and asked for, but the opportunity to use the feedback is likely to be unconnected with the initial response. However requests for external feedback will be tabulated with an "E" either alone or in combination with the component it is associated with. When an "E" appears before the score, it means that the child has requested external feedback in conjunction with the use of the metacomponent.

## Appendix B

## OPERATIONAL DEFINITIONS OF PERFORMANCE COMPONENTS

"Performance components are used in the execution of various strategies for task performance" (Sternberg, 1985, p. 105). These are actions taken by the individual sometimes under the direction of the metacomponents and can be divided into categories in terms of the type of response involved.

### Encoding component (P1)

This occurs when the child, in the course of reading or writing, makes sound-symbol associations.

- -orally sounding letters
- -spelling when reading or writing
- -reading or reciting the alphabet

### Combining and Comparing Components (P2)

The active consideration of how at least one source of information may be interpreted. The implication is that the child is exerting judgement in combining and/or comparing these sources of information. It includes:

- -orally commenting on the appearance of print
- -using metalinguistic language to describe print, ie. the use of letter, word, sentence, space, reference to spelling, etc.
- -spelling a word to explain reason for knowing (in conjunction with MC6)
- -explicit use of background knowledge and/or context, including the interpretation of the mood of the story
- -exploring alternatives in interpreting print

Response Component

Any final response in reading and writing, regardless of the cues that seemed to have been used. This will be divided into four subcategories with the following criteria.

Retrieval (P3r) - a final response that occurs quickly after a question or stimulus. It need not be totally accurate but must be contextually appropriate.

Echo (P3e) - a final response that involves echo reading or repetition of an utterance made by the examiner or interventionist.

Hypothesis (P3h) - a response involving an hypothesis or prediction, determined by the use of maybe, I think, or dealing with something in the future.

Undifferentiated (P3u) -general recognition and identification of print especially in Environmental Print tasks. This will include: identification of print by pointing, communication responses involving the use of contextual information. (ie. description of picture content), references to the context within which reading occurs, interpretation of symbols other than print.

## Appendix C

## PARENT PERMISSION LETTER

Dear

As part of my work as a graduate student, I am doing a study on the changes in children's knowledge about reading as they are learning to read. As ____________________ is becoming involved in a program of intensive reading instruction for the next few weeks, I would like your permission to include him/her as one of the children in my study.

____________________ participation involves answering some questions about reading (examples to follow) and informal tests of his/her reading knowledge before they begin the reading program and after they are finished. It will take a maximum of an hour each time.

As well, for some children involved in the program, I will be asking the teacher to audiotape the reading sessions in order to document changes in the children's knowledge of reading.

Although my study focuses on your child in relationship to the early intervention program, my study is not a part of the program. You or your child may decide to withdraw from my study at any time, which will have no effect on the intervention program. Your child's name will not be used in the research results. The audiotapes will be destroyed once the information has been studied.

Sample questions are:
"Do you know someone who can read?" "Do you ever watch them read?"
"What do they read?" Do they ever make a mistake when they are reading?"

If you have any questions about this project, I will be glad to answer them. My advisor for the study is Dr. Charles Norman of the Educational

Psychology Department at the University of Alberta, phone 492-3802. If you would like further information about the study, please contact either Dr. Norman or myself. If you are willing to have your child participate, please sign the consent form below and return it to the school. Thank you.

Judy Pool.
Phone: 439-8916 or
Educational Psychology: 492-5245 (leave a message)

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I, ____________________________ agree to have my son/daughter ____________ participate in the reading research program as described above. I understand that my child may withdraw from the study at any time and that any information collected by the researcher will remain confidential.

| | |
|---|---|
| ____________________________ | ______________________________ |
| Date | Parent's signature |

## Appendix D

# EMERGENT LITERACY TASKS

### Version for Early Intervention Study

Symbols [researcher's speech]
(actions of child or explanation of remarks)
>pointed to
{echo reading}
^^undecipherable speech
...short pause
**long pause

## Reading Interview - Part 1

1. Look at this picture and tell me what you see. (The picture is from the *Linguistic Awareness in Reading Readiness Test* - Downing, Ayers, & Schaefer, 1983. It appears to be a kindergarten or playschool setting.)

2. Can you find the people who are reading?

3. What are they reading?
4. I wonder why they are reading that? What do you think?
5. What is that person doing when they are reading?

## Reading Interview - Part 2

1. Do you know someone who can read? What about your mom? Dad?

2. What do they read? Why do they read that? Do you ever watch them read?

3. What do they do when they are reading?

4. Does someone ever read to you? What do they read to you? (Probe for specific stories, books)

5. What do they do when they are reading that?

6. Do you ever help them? How?

7. When ________ is reading to you, do they ever make a mistake? Do you ever catch them making a mistake? How do you know when they read something wrong?

8. Can you read yet?

9. What kinds of things can you read?

10. Do you read the same way as ____________?

11. Would you like to know how to read better?

12. Are you going to learn how to read? How are you going to learn? Will someone teach you? Where will you learn how to read?

13. Why do children learn how to read? What's good about reading? What happens to someone if they grow up and they don't know how to read?

14. Can a baby read? Why or why not?

15. Can a puppy read? Why or why not? Could we teach them how to read?

16. Can a (concrete object) read? Why or why not?

17. Can I read? How do you know?

18. Can I read like this (demonstrate with eyes closed)? Why or why not?

19. Can I read with my mouth closed? Why or why not?

20. Can a doll learn to read? Why or why not?

21. Is reading the same as watching T.V.? How is it the same or different?

22. Is reading a story in a book the same as telling a story? How?

## Magazine Task

The magazine is a Chickadee issue. The page used is a puzzle page, with print, symbols and pictures.

1. What is this? (the magazine)

2. What should we do with it?

3. Let's open it (open it to the middle page). There are some things to read here. Can you find them? (Place a checkmark on areas of text identified. Use arrow to record direction of sweep).

4. (Show the child the underground print) Do you know what that says? You can take a guess.

5. (Show the child the symbol-sentence). Can we read this? Why or why not? Can you tell what it says?

6. (Show the child the centre pictures). Can we read these? Why or why not? Can you tell what it says?

7. Find a word on this page. How do you know that it is a word?

8. Find a letter on this page. How do you know that it is a letter?

9. (Show the child the symbol-sentence). Are these words? Are they letters? What are they?

## Readability Cards

I am going to show you some cards. Some of them have things to read and some have things that we cannot read. Look at each one and tell me if we could read it. (For each one, ask the child why). Based on Ferreiro and Teberosky's work, 1982)

1. Shapes (geometric shapes drawn in groups, like words.)

2. dog

3. She goes to school.

4. B

5. Happy face (A drawing of a happy face.)

6. I can play.

7. Upside down word. (I like milk. like is upside down.)

8. AZ

9. alphabet (The complete alphabet written with no spaces.)

## Environmental Print Objects

Look at each one and tell me about it? Is there anything to read on it? What does it say? How did you know that?

1. Pepsi can.

2. Crest toothpaste box.
3. Lifestream Natural Yogurt (the container)
4. The Edmonton Sun (the local newspaper)

## Environmental Print - Pictures

(These are snapshots taken of stores and signs in a local neighbourhood.) I am going to show you some pictures. Look at each one and tell me what you see. Is there anything to read in that picture? What does it say? How did you know that?

1. Transit Zone (bus stop sign)
2. 7 - 11 (corner store)
3. Petro-Canada (gas station)
4. Exit (sign in a parking lot)
5. Shopping Carts Here (sign with lots of print. Directions on how to get a grocery cart.)
6. Stop sign

If the child does not identify reading, go through them again and ask the child to find the signs.

## Environmental Print-Logos

(These are pictures that contain only the sign from the environmental pictures, or the logo from the environmental objects.)

Now I am going to show you some more things. Look at each one and tell me about it. Is there anything to read there? What does it say? How did you know?

1. 7-11
2. Stop
3. Yogurt
4. Sun
5. Exit
6. Petro-Canada
7. Pepsi
8. Transit Zone
9. Crest
10. Shopping Carts Here

If the child noticed the similarity to the picture or object, ask how he or she knew.

## Book Knowledge Test

The book used was A Dark Dark Tale (Brown, 1981).

1. (Show the child the book.) I have something here. What is it? Have you ever seen this one before?

2. What should we do with it?

3. What do you think it might be about? What told you it might be about that?

Title page
4. (Open the book to the first page, or ask the child to find the beginning.) I'd like you to read this to me.

5. (In response to a refusal, or an attempt to read.) I'll read it now but I'd like you to help me.

First page
6. Tell me where to start. Once upon a time there was a dark dark moor. What should we do now?

Page 2
7. On the moor there was a dark dark ... (Let the child complete, and ask how he or she knew.)

Page 3
8. In the wood there was a dark dark ...(Let the child complete and ask how he or she knew.)

Page 4
9. Try reading this page.

Page 5

10. Let's read this page together. Tell (or show) me where to read. Behind the door there was a dark dark hall.

Page 6
11. What should we do with this page?

Page 7
12. Up the stairs there was a dark dark passage. Are you scared yet? If I get scared, what should we do?

Page 8
13. Now let's play a game. Let's pretend that I don't know how to read very well. Sometimes I make mistakes. Your job is to listen carefully while I read, and let me know if I'm right or wrong. In the passage was a dark dark curtain. Right or wrong? What told you?

Page 9
14. The cat. Right or wrong?

Page 10
15. We drove to Calgary in a car. Right or wrong? What told you?

Page 10
15. I'll read that one again the right way. In the room there was a dark dark cupboard.

Page 11
16. Now listen and tell me if I'm right or wrong. The cow jumped over the moon. Right or wrong? What told you?

17. Now I'll read this page. In the cupboard was a dark dark corner. Right or Wrong? What told you that?

Page 13

18. What do you see there? How can we find out what it is?

Page 14

19. Turn the page or let the child do it. In the box there was a ....How did you know?

20. How do you think the mouse feels? What let you know that?

21. What do you think he's scared of? How did you know that?